

Christchurch, New Zealand: The Tumultuous Nature of Land and Sea

An Honors Thesis (LA 404)

By

Jacob Stachler

Thesis Advisor:

Jody Rosenblatt-Naderi

Signed

Ball State University

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Executive Summary

During September of 2010 and February of 2011, earthquakes shook Christchurch, New Zealand. Almost 8,000 homes along Christchurch's riverfront have been deemed uninhabitable due to the marred earth beneath them. Purchased by the state, these ruined houses are currently undergoing demolition, leaving large swaths of vacant land within the city's neighborhoods. This project addresses design methodologies in post-disaster contexts and riverfront developments in order to guide the reprogramming and design of these emptied sites.

This project begins with a foundational knowledge background on post-catastrophe management and design. From there, site specific research and analysis is applied to red-zoned areas of Christchurch's eastern suburbs. The analysis focuses on three main issues: program, circulation, and ecology. Concepts and case studies are derived from these issues, ultimately giving way to the master plan. Zooming in, the playground area of the site is designed in greater detail, showing how culture and ecology fit together at a human scale.

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Barb Stedman and Andrea Wolfe, who encouraged my initial initial inter-
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and of course my parents, for their continued support





Preface

Our story begins with the story of Maui. Maui was a fisherman in a family of fishermen, and he was the best of any of them. One day while fishing with his brothers, he urged them out farther and farther into the sea. He cast his hook deep into the ocean, and from it pulled up not a fish, but land, earth, and soil. Maui raised New Zealand from the sea, but in February of 2011, the land began to return to its origins.

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Introduction

"The greatest glories lie not in never falling, but in rising every time we fall" - Nelson Mandela

Disaster and catastrophe within our urban cities is unavoidable and uncontrollable. From 2000 to 2009, the various continents of the world suffered over 7,100 disasters (McClellan 166). Designers are repeatedly challenged with how to guide a city's reconstruction and recovery following destruction, yet few design standards exist. The varying scopes of scale, culture, economy, and architectural history make every rebuild unique. This research begins to examine the world's history of urban destruction, looking for commonalities across time to guide future reconstructions following urban catastrophe.



2011 Disasters



Residential Damage Following Earthquake

This research is to be applied to Christchurch, New Zealand, where the 2010 and 2011 earthquakes crumbled the city's architecture and decimated the country's economy. On top of the 185 killed from the earthquake and destruction of over 100,000 buildings in the city's central business district, 8,000 residences have been destroyed or are currently undergoing destruction after being red zoned. Large sections of neighborhoods have now become abandoned fields, and the opportunity exists to return this land to the public domain.

This project examines the red zoned areas of Christchurch, exploring the potential of transforming the riverfront land into a series of public parks. With the red zone running from the central city to the bay, the research will assist in weaving together the area's urban and ecological fabric. Furthermore, the project will connect the various neighborhoods of Christchurch through which this datum runs. Finally, the research will begin to suggest design methodologies in urban reconstruction.

Knowledge Background

There is a dichotomy that arises out of destruction. For many, recovery is “a goal that involves the restoration of normal community activities that were disrupted by disaster impacts – in most people’s minds, exactly as they were before the disaster struck” (Lindell 812). However, while many search the past for answers, others are in pursuit of opportunities for the future. This review looks to analyze the ways in which landscape architects, architects, and designers can assist in a city’s return to normalcy while simultaneously creating a vision for the city’s future. The following literature review will examine relevant findings in post-disaster design and riverfront development to guide the urban design of Christchurch.

Post-Disaster Management and Design

Civilization’s extended history with urban demise is spread across a wide variety of cultures and geographies. But despite a long history containing a high quantity of dynamic examples of reconstruction, there is an apparent small number of consistent design theories to guide designers and policy makers following a tragedy. The subject matter’s inherent connectivity with an area’s political, social, and economic systems often causes design policies and methodologies to be individually created by each city or country following a natural disaster. However, as patterns of post-disaster design are examined on a global scale, common trends among reconstruction tactics can be seen. The reconstruction of symbols, sharing of stories, and application of building technologies are monumental factors in the success or failure of a city’s rebuild following tragedy. This section examines the broad history of urban reconstruction, reviewing a wide range of case studies that illustrate the consistent design methodologies in post-disaster design.

The Reconstruction of Symbols

Since the beginning of civilization, the presence of symbols in urban culture has established the foundations of city resilience. The symbolism that lies within a nation’s capital and the significance behind a city’s architecture has the power pull people to place, and MIT professor of architecture Julian Beinart shows that no city illustrates this better than Jerusalem. Repeatedly banged, bruised, and beaten, Jerusalem “is the greatest site of physical destruction and renewal known to history. For some 4,000 years it suffered wars, earthquakes, and fires, not to mention twenty sieges, two periods of total desolation, eighteen reconstructions, and at least eleven transitions from one religious faith to another” (qtd. in Vale 181). While the fighting and transitions between religious faiths has admittedly caused much of Jerusalem’s destruction, its existence

as the religious capital of the Middle East has also spurred the city’s continuous reconstruction. The literature states that Jerusalem’s persevering life has been sustained “through the reuse and resymbolization of buildings and by their repeated location on the same sites, and...such allegiance to place creates recognition of diversity and, at the same time, universality” (qtd. in Vale 204). In Jerusalem, despite any travesty that has befallen the city, its continued reconstruction upon the footprints of that which was destroyed has resulted in a city full of dynamic architecture that celebrates history while preserving the familiarity of place.



Jerusalem Under Siege and Fire

Although the architecture of Jerusalem has been consistently destroyed and reconstructed, not every destroyed symbol is reborn. Rather, methods for choosing what is rebuilt and what is not lie in “the connection between place (a venerated site) and spirit (promised salvation)” (qtd in Vale 194). A clear example can be seen in the destruction of Jewish versus Christian symbols. When the first Jewish temples of Jerusalem were destroyed, “the loss of the remote and awesome temple was compensated by the creation of a more intimate and available form of congregation” (qtd. in Vale 189). While for the Jews the architecture was simply a vessel within which to worship, for Christians “the church stood on sites that were never lost, and could never be lost...Building and belief were integral to one another” (qtd. in Vale 195). The church is a “monument to the practice

of reconstruction" (qtd. in Vale 193) because of the architecture's connection to the human spirit.

The reconstruction of architecture as a means of rebuilding the human spirit has acted as a successful design methodology for cities throughout time, especially following human-caused destruction. Following the world wars that consumed the first half of the twentieth century, much of Europe was reduced to rubble—the worst destruction in the continent's history. The damage in Warsaw, however, was atrocious. Urban planner and filmmaker, Jasper Goldman, shares the history of the city's endurance, stating, "the city endured three waves of destruction: during the German invasion of 1939, the Jewish ghetto uprising of 1943, and the Warsaw uprising of 1944 and their aftermaths...by the time the Soviet army occupied the city in January 1945, over 80 percent of the buildings in the city lay in ruins. Yet almost from the moment the city was liberated, it began to recover" (qtd. in Vale 135). The city immediately got to work rebuilding key streets and buildings, and the climax of its reconstruction occurred with "the rebuilding of the Old Town, the historic core of the city that symbolized 700 years of Warsaw's history. Its completion—in 1961—above all suggested a rebirth of Poland's cultural and historical



Warsaw after WWII. 3D Rendering by Platige Image Studio

identity" (qtd. in Vale 136). The unrelenting reconstruction of Warsaw's greatest cultural symbol breathed new life into a demolished city.

Symbols, however, do not need to be old. After the British sacked and burned much of Washington, D.C. during their invasion of 1814, the decision to reconstruct the White House was critical to keeping the young country's capital in place. Author Anthony Pitch states that the White House's reconstruction "yielded one of the most awesome symbols of political power and national identity ever built, architecture familiar to millions around the world. For Washington, the completion of the Capitol marked the conclusion of a triumphant comeback. The city had risen from the melancholy ashes of 1814 to assume a place in the pantheon of national capitals" (qtd. in Vale 113). The salvation of young symbol founded a national culture of tenacity.

The Celebration of Culture through Narrative

Following a natural disaster, the sudden tearing of a symbol is a struggle to come to terms with. An associate professor of American studies at Smith College, Kevin Rozario states that "one of the most urgent tasks of reconstruction has been to try to make sense of the disaster, to discover (or establish) meanings that help people to recover a sense of mastery over their natural and social surroundings" (qtd. in Vale 31). People need to find a way to move forward, and the reconstruction of symbols through the act of storytelling—the sharing of narrative and expression of voice—is an essential instrument of progress following natural disasters that helps people begin to understand their rapidly changed environment.

In American culture specifically, narrative has been a pivotal factor in reconstruction. Rozario points to Chicago fire of 1871 and San Francisco earthquake of 1906, stating that despite the fact that "it may well be instinctive for people to turn calamities into stories—they have been doing so at least since the flood of the Gilgamesh epic...nineteenth-century men and women turned to narrative on such occasions with new urgency, as if convinced that only in such historical tales would they find answers to the deepest mysteries of nature, society, and suffering" (qtd. in Vale 35). Writings allowed people to escape visions of calamity in front of them and create or read about the future vision of the city on paper. In Chicago, "fire writings helped middle-class men and women to connect emotionally with an official culture of optimism" (qtd. in Vale 39-40) and in San Francisco, "disaster narratives made the recovery of the Bay City seem inevitable" (qtd. in Vale 45).

In Christchurch, the community's narrative has physically filled earthquake-destroyed areas with imaginative public spaces. The principal urban designer at Christchurch City Council, Hugh Nicholson, shares that new, community-driven architectural installations "have become symbols of people's hopes and aspirations for the rebuild" (Nicholson 80). Senior lecturer Neil Challenger from the local university, Lincoln University, agrees, adding that the upcropping of these installations are not only acting as temporary fill-ins until the city gets rebuilt, but are actually beginning to define and evolve Christchurch's design strategies. They have become an "exciting, invigorating, and palpable addition to the Christchurch landscape, potentially creating a new genre for the city" (Challenger). However, while community groups have provided vibrant new pocket



Christchurch Furniture Installation

parks throughout the city, using liberal and artistic design strategies that have influenced some of the city's greater design strategies. Most of the city still remains the same as it ever was. During a recent televised panel discussion, Sir Mark Solomon, head of the local Maori tribe Ngai Tahu, remarked "that the rebuild had not put enough emphasis on sustainability. It was certainly one of my visions that we would adopt full green technology across the city. But if you go through the subdivisions – including our own – it's the same, same old" (Anderson). While many community members and organizations are trying to push the design envelope in Christchurch, they have struggled to find widespread change due to a lack of innovation and implementation of building technologies.

The Application of Building Technologies

The struggle to assess and implement proper building technologies following a natural disaster plagues cities across the world. It is during reconstruction that urban designers are presented with the opportunity to study land-use and building construction practices, infrastructure resilience, and environmental recovery (Lindell 815). Decisions in material and methodology made from this study can define a city long after reconstruction has ended, both positively and negatively.

Bryn Mawr College's professor of architecture, Carola Hein, shares the story of Japan, in which "natural disasters have destroyed, in whole or in part, Japan's cities on numerous occasions. Human action, whether internal warfare or the air raids of the Second World War, has been the cause of further devastation" (qtd. in Vale 213). In response to this, pre-modern Japan sought to quickly reestablish the city's familiarity through the conscious use of construction technology. By using wood construction, Japanese cities found that they were better prepared for typhoons and earthquakes, and even when fires riddled a city "rapid reconstruction was possible because the former

buildings typically had been burned to ashes, effectively clearing the sites and enabling new wooden structure to be built almost overnight... land divisions and the reliance on traditional building materials and techniques favored a return to previous urban forms" (qtd. in Vale 215). The use of functional and familiar building materials has created a country that is resilient to the many disasters that frequent it.

Inversely, in Marathwada, India, the government assumed that traditional construction materials—namely wood and stone—were to blame for the massive damage following an earthquake in the area. However, research performed at Ritsumeikan University in Japan states that the use of wood and stone was a "traditional construction process...carried out by craftsmen who have been building in wood and stone for generations. However after the earthquake traditional construction systems were condemned as unsafe and reconstruction policies further encouraged new materials and construction techniques. As a result traditional craftsmen...lost their livelihood" (Jigyasu 21). A new methodology was introduced into a system that was unfamiliar with the construction system, resulting in both poorly built structures and a marginalization of local building traditions and skills. Similarly, construction methodologies were changed following earthquakes in Chile, and structures that had traditionally been built out of function and to last were replaced by technologies that were designed to simply recreate a likeness to previous structures. These new technologies were not only poor mimics to the real thing, but lacked in the sustainability of the area's traditional adobe system. According to a case study from University College London, the people of Chile discovered that "a problem of authenticity is underlying the design process for new dwelling: do we want to conserve the built form of heritage areas or the building tradition behind them?" (Loustalout 32). The new designs became a museum of representations of what the area used to look like instead of progressively moving forward.

Riverfront Development

Throughout time, humans have been founding cities in geographies chosen solely because of the proximity to water. Oceans, lakes, rivers—these are the lifeblood of urban development. Unfortunately, with them comes a slew of natural disasters whose effects have been instigated by the installation of city infrastructure. Indeed, Argentinian architect Jimena Martignoni writes, "the more physically related to water a city is—how the city originated in terms of land transformation, modifying river banks or ocean coasts with land filling, construction of channels, dredging, steam covering, and so on—the more exposed it becomes and the more vulnerable its infrastructure and people are" (Martignoni 59). Ecology must be stitched into



Typical Japanese Wood Architecture

the urban fabric, blending sustainable design with social opportunity. This section will examine waterfronts, focusing on methodologies in urban riverfront reclamation, as well as environmentally-aware design principles and technologies.

Urban Riverfront Reclamation

Historically, riverfront cities were developed as a means of economic development. According to the American Planning Association's book on riverfront design, *Ecological Riverfront Design: Restoring Rivers, Connecting Communities*, the growth of riverfront cities "was centered around transportation, general commerce, ship building, and commercial building" (Otto 2). This remained true until the 1950's, when "technological changes caused profound shifts in waterfront land use" (Otto 2). The development of suburbs and the highway transportation system caused cities and businesses to turn their back on the river, and rivers across the country remained abandoned for over twenty years. It wasn't until the 1970's that "a growing interest in historic preservation and...efforts to counteract suburban flight by reviving the urban core" (Otto 4) caused cities to begin redevelop their waterfronts. Since then, the American Planning Association argues that two factors have driven the reclamation of city riverfronts: a desire for more park space and greenways and a need for water quality improvement and brownfield revitalization.

Park and greenways are an important piece of healthy urban living. In their book *Urban Parks and Open Space*, the Urban Land Institute and The Trust for Public Land state that "judicious spending on park development stimulates widespread and sustained private investment, alters settlement patterns, encourages social interaction, and reshapes the very character of daily life" (Garvin 2). Social interaction in urban spaces has been advocated for since the 80's, when William Whyte released his book and film *The Social Life of Small Urban Spaces*. Whyte believed that open space a "part of the commons, property that belonged to no one and to everyone at the same time. He also saw that over the long term, the preservation of natural areas reinforced an attachment to place that could only strengthen community life" (Christensen). Whyte understood the potential of city resilience to be found through social engagement in urban landscapes during a time and culture of social seclusion brought by sprawling urban form. Today, increased public awareness in today's culture has placed increased attention on reversing the decentralization of previous generations. Literature published from California State Polytechnic University Pomona states that there is a "growing social revolution among young people in this country and Europe today...and through the phenomena of the teach-in, love-in,

be-in, happening theatre of confrontation and countless other experiments in social restructuring, many are seeking to find ways to build true urbanity into the decaying framework of our cities" (French 86). By using social interaction in park design to build urbanity into city infrastructure, designers are not only increasing a city's livability, but also its resilience.

In New York, Bjarke Ingels (BIG) looked to create a resilient park fueled by social engagement through the design of a pedestrian loop around the city that integrated coastal protection against hurricanes. Bjarke Ingels states that their goal in the project was to design "in a way that wouldn't be like a wall between the city and the water, but rather a string of pearls of social and environmental amenities tailored to [Lower Manhattan's] specific neighborhoods, that also happens to shield their various communities from flooding. Social infrastructure understood as a big overall strategy rooted in the local communities" (Quirk). Rather than forcing nature into the urban setting, BIG carefully considered the site's existing ecology and topography and placed within this framework a social infrastructure that provided flood protection while at the same time creating community spaces for social interaction.

However, when human needs are denied in the design of parks, cities are simply with another abandoned and underutilized space in the urban fabric. An article in *Praxis*, the journal of writing and building, looks again at New York City, this time during the 1960's when mounting pressure for the clean-up of the terribly polluted Hudson River put policy makers into action, gaining funding for a river clean-up plant. While the plant dramatically improved the quality of the river, its terrible smells drastically decreased the quality of living in the dominantly Black and Hispanic neighborhood it was placed in. The article's author postulates that care for the environment is inextricably linked to care for people, stating "people are an integral part of what should be understood as the environment" (Mogilevich 25). Social and environment are not two separate issues.

Ecologic Design Principles and Technologies

At the time, the Hudson River's clean-up plant was the best way the city knew how to clean up the river, so it was built regardless of the social cost. Today, increased public awareness and methods in bioremediation allow for more social- and ecologically-friendly river clean-up. We understand now that preemptive protection of the waterfront is "the best way to ensure the health of an urban waterway... Allowing development to disturb these features and then attempting to reconstruct them—even using best management practices—is no substitute for protecting the intact elements of a healthy ecosystem"

(Otto 47). Architect Rem Koolhaas agrees adding that, "we need to view the fragility of the planet and its resources as an opportunity for speculative design innovations rather than as a form of technical legitimization for promoting conventional solutions" (qtd. in Mostafavi 17). The best ecological design principles use design to protect existing ecologies.

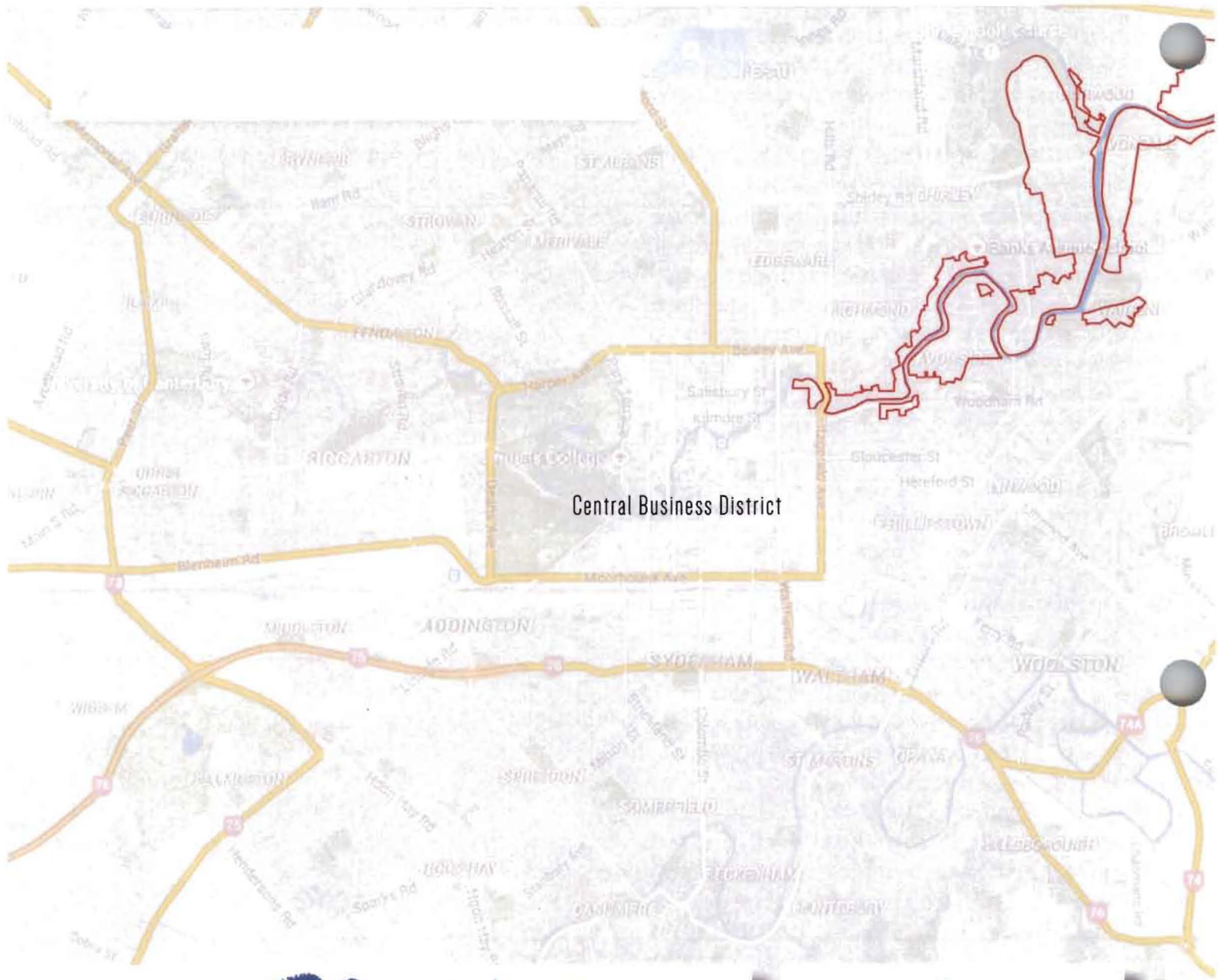
This is being done across the country, as cities take what little waterfront they have a left and preserve what they can of it, building upon these foundations to reclaim the water. Landscape Architecture Magazine illustrate this point in article discussing Lee Weintraub's Riverfront Park in Newark, New Jersey, a three and a half acre project in which Weintraub shows the city the potential of the polluted, industry-inflicted river. A riverfront boardwalk with boat launch and art installations, Weintraub has transformed the space from brownfield to green space. The Agent Orange polluted river has been under serious clean-up over the past 30 years, becoming a Superfund site in 1984. The article states, "It is a sophisticated, tightly organized design...It is a green space that has been carved out of a brownfield abutting a Superfund site. And it is one of a series of a public-access areas that this beleaguered city and citizens are stitching together as they try to reclaim Newark's more than three-mile waterfront after decades of degradation and neglect" (Margolies 104-105). This park becomes an example for the rest of the Passaic River as to what its abused riverfront could be, as well as providing much needed park space to a city that is only 5% parks. The park was born out of community "walkshops", with a simple goal of getting 2% of the city's population to give input on the project. The long-term goal is to connect this park to great city-wide riverwalk.

A similar article in another issue of Landscape Architecture Magazine discusses the use of this methodology along the Los Angeles River. Currently a concrete ditch running through the city, the river is better known for cinematic depictions of car and motorcycle chases than being an ecological feature of the city (Zell). Born of another generation, the city is trying to recover what it can of this magnificent water runway, returning it to nature while at the same time creating park space in a city that is very much lacking public green. Because so much of the river has been landlocked by urban development, the design proposal for restoration is episodic—ecological in one space than urban in the next (Zell).

Conclusion

In conclusion, relevant findings in post-disaster design and riverfront development can begin to guide the urban design of resilient cities. In reacting to disaster, the reconstruction of symbols,

sharing of narratives, and functional application of building technologies can result in resilient cities. Similarly, the application of these principles can better prepare us and mitigate the effects of natural disaster. A high number of natural disasters are instigated by a city's proximity to water, so understanding the resilient values of stitching social infrastructure into existing ecological conditions is an important part of both park design and water quality improvements.



World Vicinity Map

Earth



New Zealand Vicinity Map

The Problem and Its Setting

Residential Red Zone

This project will focus on the residential area along the Avon River in Christchurch, New Zealand, that was red-zoned after the 2010 and 2011 Canterbury earthquakes, analyzing post-destruction design strategies, practices, and techniques to create an ecological riverfront corridor that restores the ecology and shares the history of the Maori landscape.

This project will begin to articulate design strategies in post-destruction contexts, as well as provide a wealth of benefits to the people of Christchurch. Socially, the design will not only create outdoor social areas that bring people together, but it will do this through a binding greenway connection that connects the city to the sea and north and south neighborhoods. Ecologically, this design will begin to implement strategies that heal an Avon river that was already degraded, whose condition was only by the sedimentation and liquefaction that occurred after the earthquakes.

Earthquake Epicenter

Story of Community

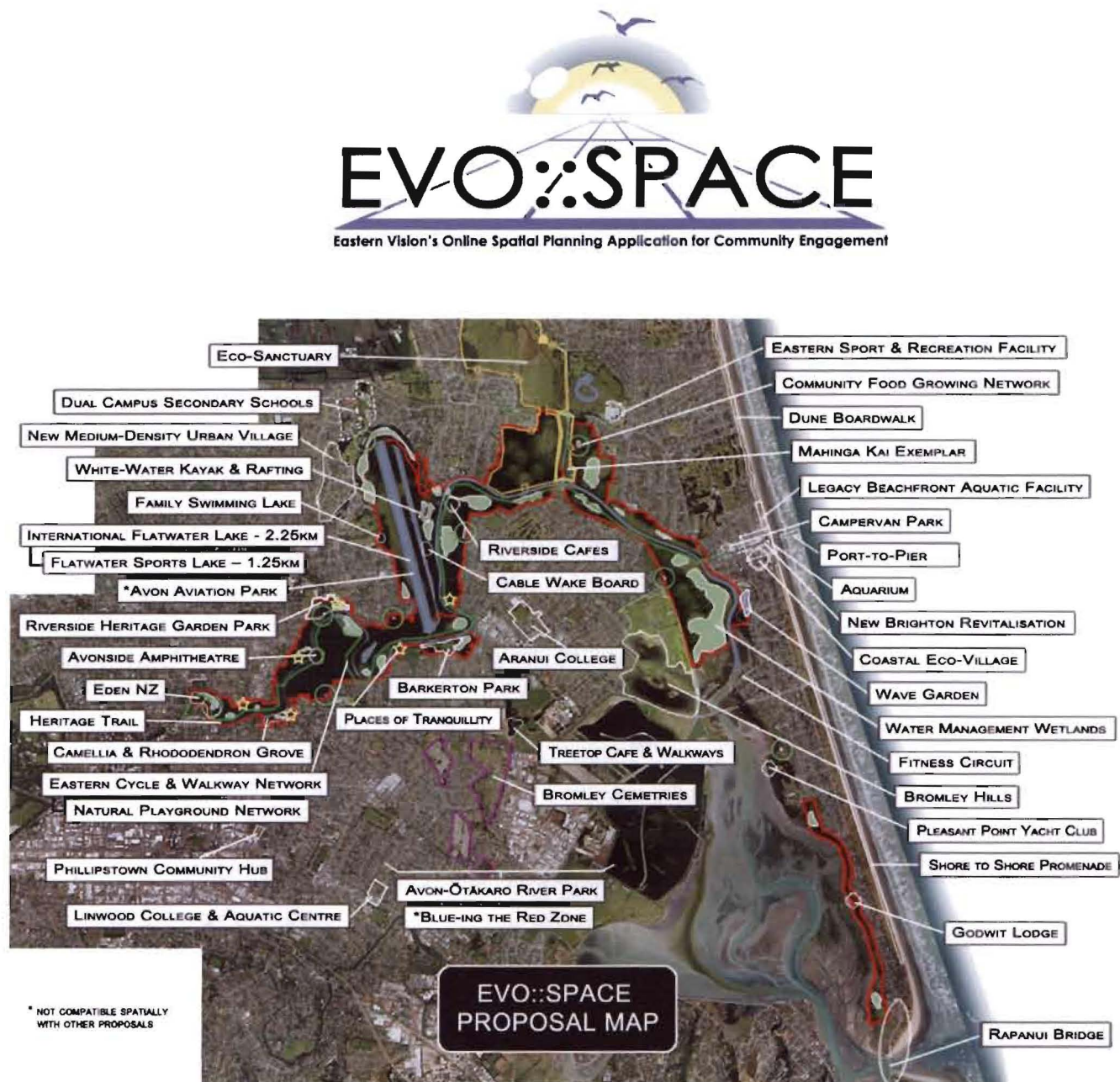


Fig 1: Map of EVO::SPACE Proposals

Evo::Space Proposal: Image by Eastern Vision

Following the earthquakes, a petition was distributed that garnered over 18,000 signatures, all in support of transforming the red-zone into a new riverfront park. A fantastic opportunity, the question became how to program the space, and everyone had their own idea on what would be best. Dozens of proposals have been compiled, but there is still no clear direction. The diagrams above and to the right were compiled by Eastern Vision, an organization dedicated to stewarding the creation of great new places in the eastern suburbs affected by the earthquake.

The map above shows a compilation of the many ideas that have arisen for the eastern red-zone. There are many visions for what this can become. The diagram to the right is an analysis diagram, showing the level of community support each idea has.

Proposal Feedback Summary

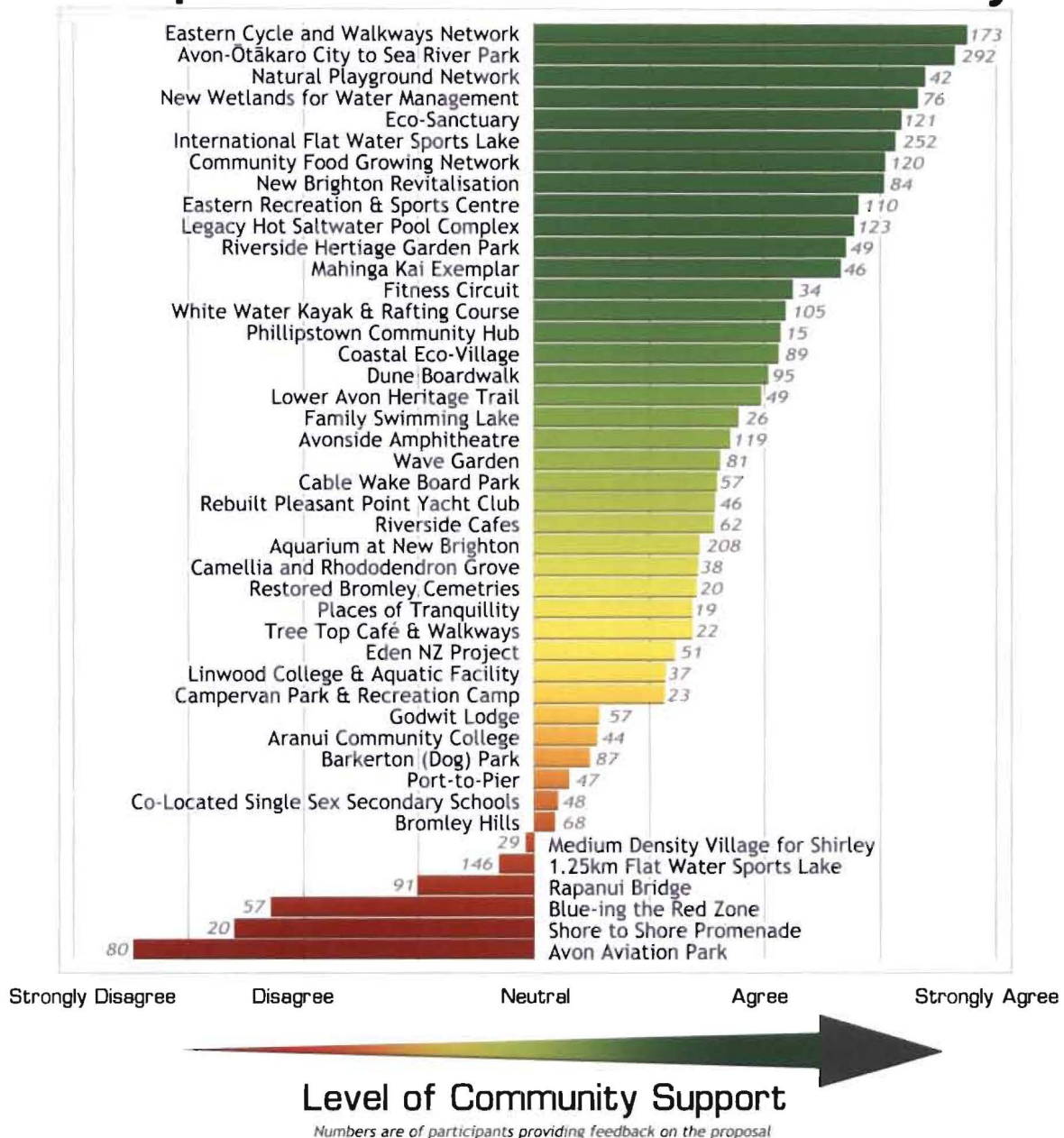
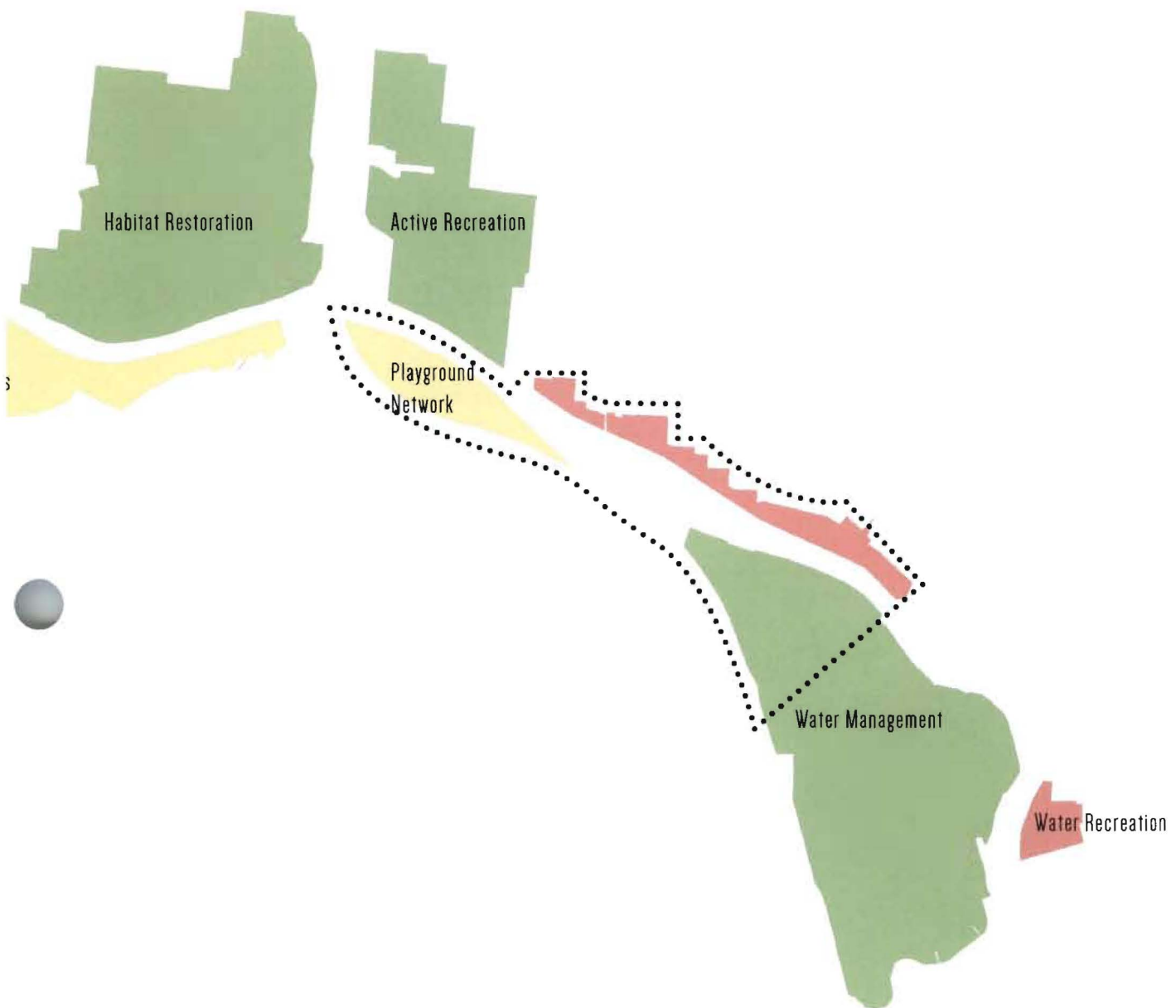


Fig 6: Level of Community Support by Proposal

These results were obtained by assigning a value between 2 and -2 for the agreement options then averaging the scores for the proposal sample.

Site Selection





The diagram above evaluates presented design proposals by neighborhood, ranking the space use based on strength of the idea and community support. From this, a site was chosen that contained multiple neighborhoods with many ideas that ranged in support and vision. Strong ideas could start to create a framework and direction for the vision of the site, while areas weak or lacking in vision would allow for greater design creativity.

Case Studies

After examining the analysis provided by Eastern Vision, it was discovered that many ideas had overlapping programmatic themes. Six key themes were extracted from this data, and corresponding case studies were evaluated.



Pedestrian Circulation

Liupanshui Minghu Wetland Park

An ecological restoration project with the goal of slowing down storm in a local river ecosystem, this project used the architecture of the pedestrian path to mimic its ecological goals in the social stratosphere. The winding boardwalk slows the movement of people, encouraging interaction with the landscape and with one another.



Water Recreation

Los Angeles River Revitalization

The transformation of the Los Angeles River from a concrete canal to a restored ecological asset gave opportunity to allow for interaction with the water, pulling people down to the water's edge and allowing space for boat put-ins and other water recreation.



Ecological Restoration

Blue Heron Lagoon

This project reestablished fish habitat in the Detroit River at Belle Isle Park by reconnecting the island's lagoon with the river's mouth. This not only allowed a habitat for fish spawning, but also resulted in a peninsula for reptiles and amphibians.



Urban Development

San Antonio River Walk

San Antonio has integrated the San Antonio river to be a vital part of their urban fabric, pulling people to water's edge and acting as a centerpiece for city activity.



Playground Network

Beacon Mountain Playground

This playscape is unique in that it is ecologically oriented, playing off the topography of the site to create a system of climbable spaces that seamlessly melds children with their environment and gives opportunity to learn and play.



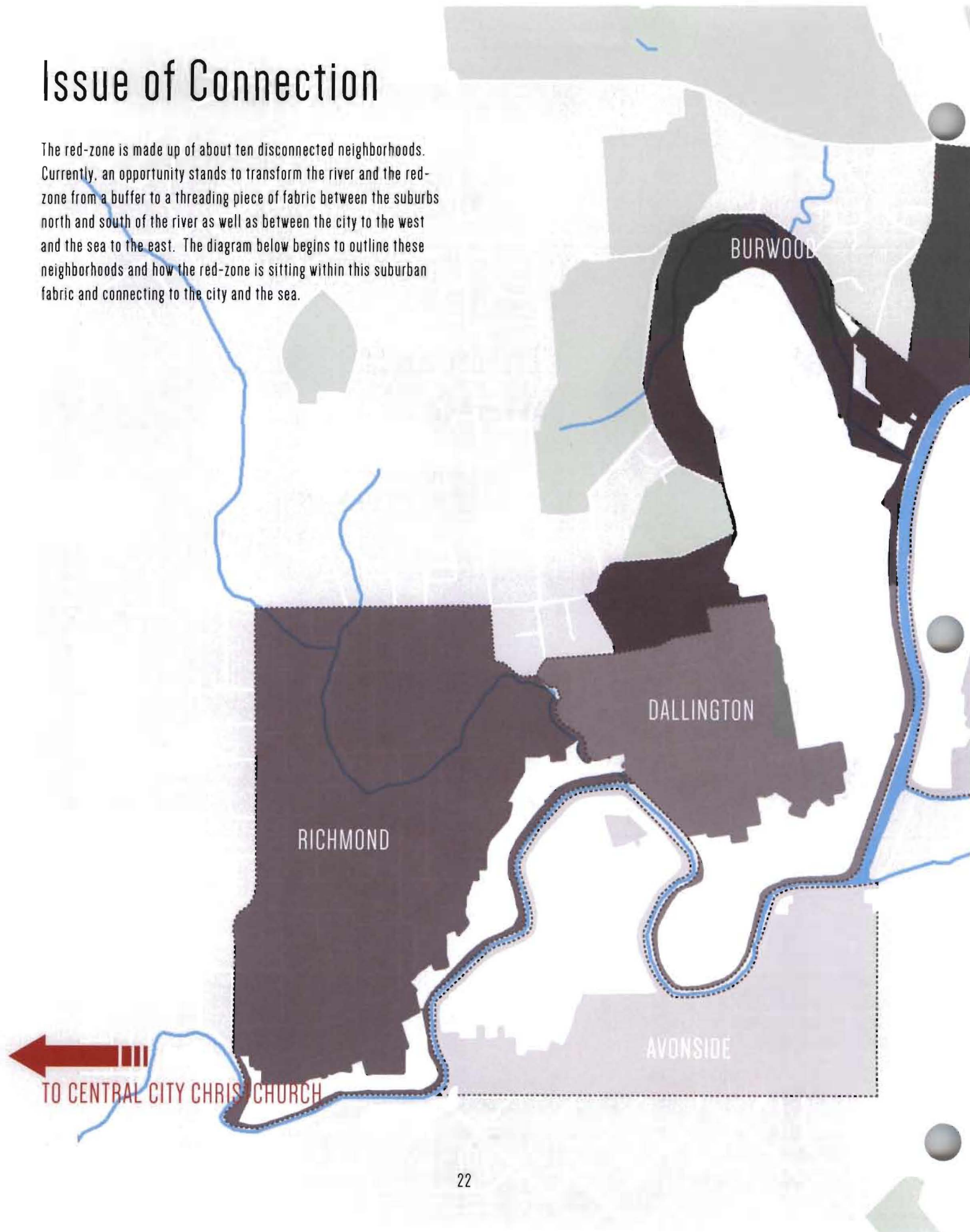
Community Agriculture

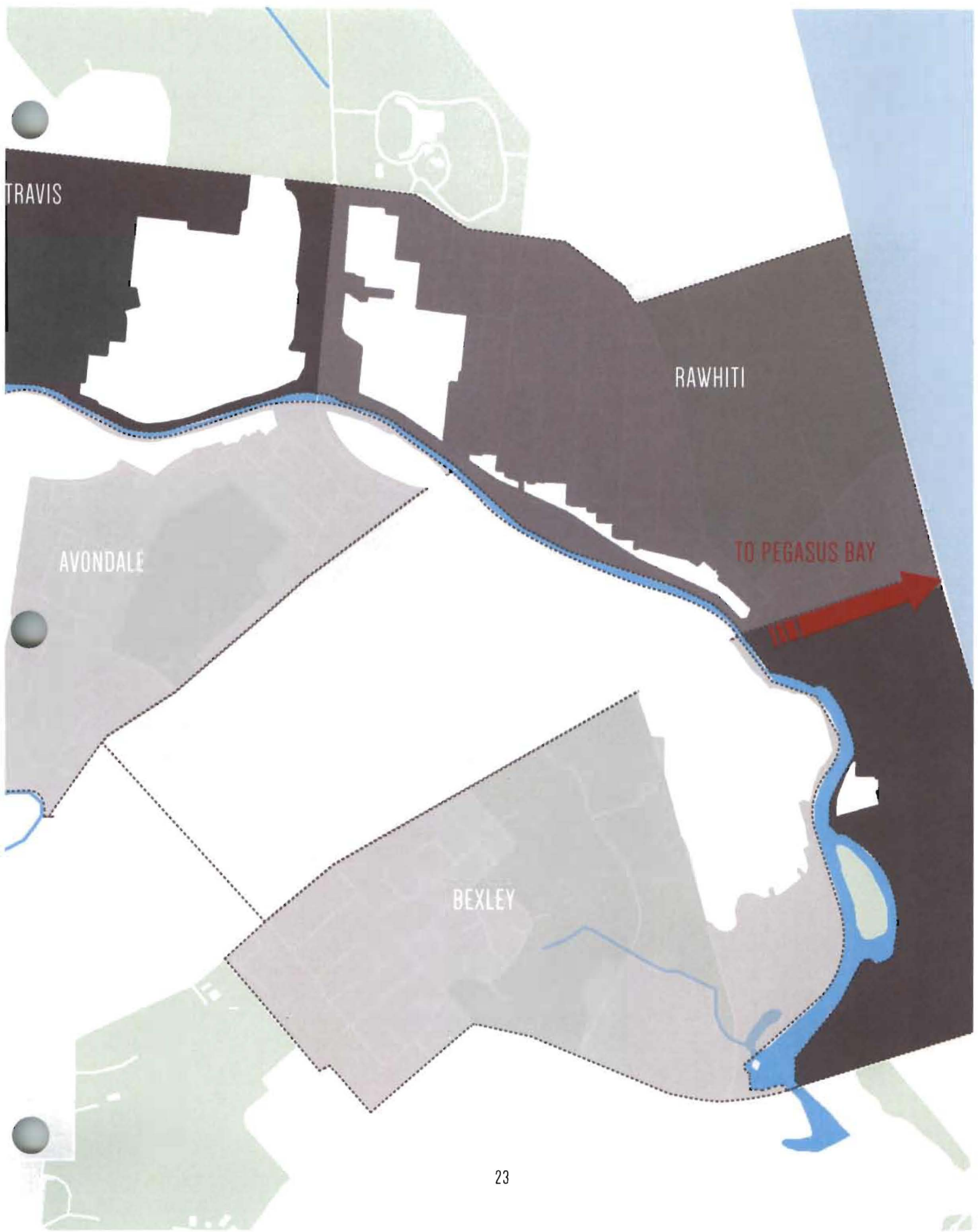
West Oakland Urban Farm and Park

Transforming an abandoned site to an urban farm and community park, this project used community-driven design to create a public asset for local residents that is also able to double as a place for outdoor recreation.

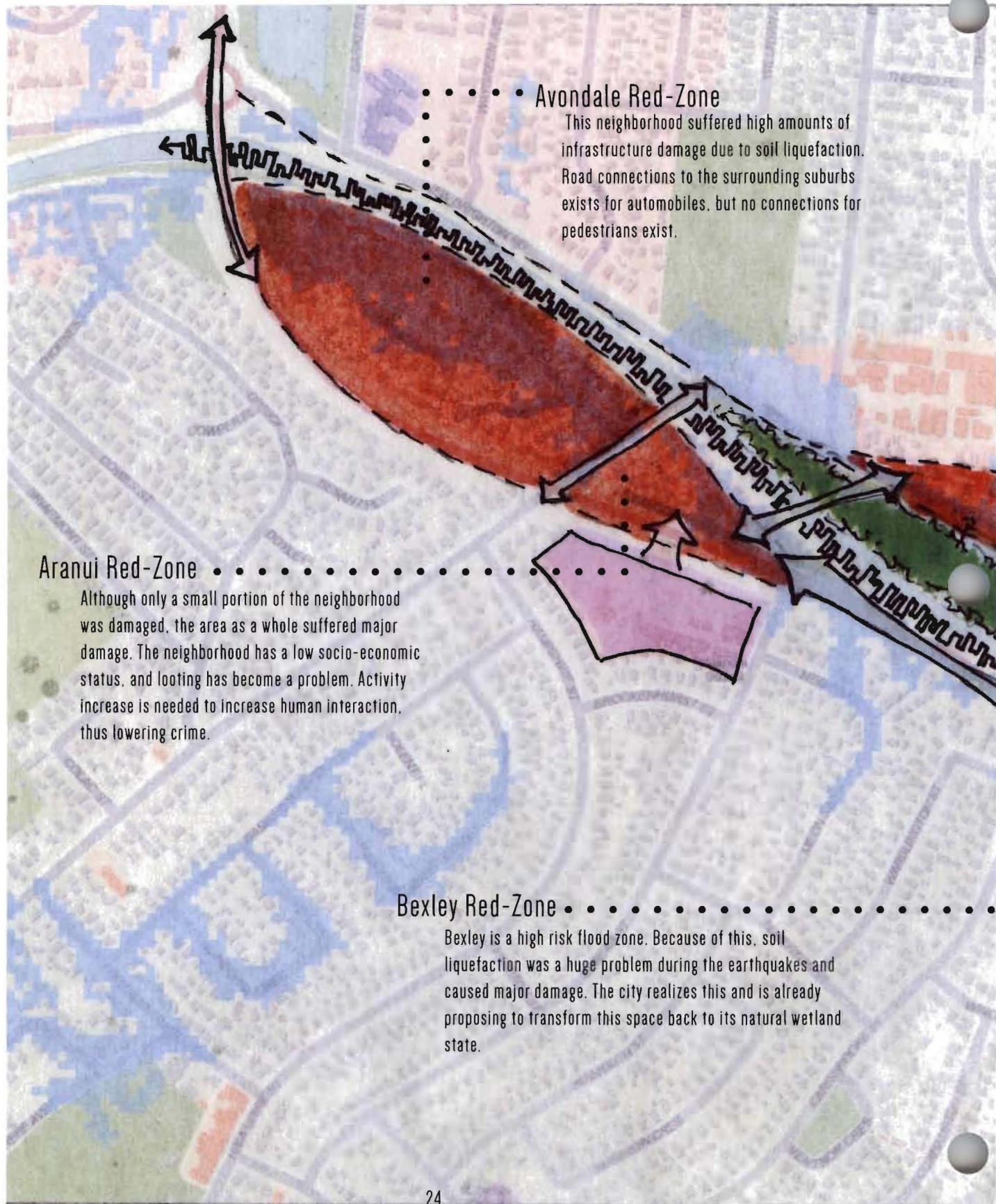
Issue of Connection

The red-zone is made up of about ten disconnected neighborhoods. Currently, an opportunity stands to transform the river and the red-zone from a buffer to a threading piece of fabric between the suburbs north and south of the river as well as between the city to the west and the sea to the east. The diagram below begins to outline these neighborhoods and how the red-zone is sitting within this suburban fabric and connecting to the city and the sea.





Site Connections



A map of Christchurch, New Zealand, showing the city's layout and surrounding areas. The map is color-coded: green for parks and reserves, blue for water bodies, and red for the Rawhiti Red-Zone. A dashed line with arrows indicates a connection between the Cockayne Reserve and the Rawhiti Red-Zone. A scale bar at the bottom indicates distances in feet (0, 500, 1,000, 1,500, 2,000). A north arrow is located in the bottom right corner. The map is overlaid with a grid of streets and a network of dashed lines with arrows indicating connections between different areas.

• • • • • Cockayne Reserve

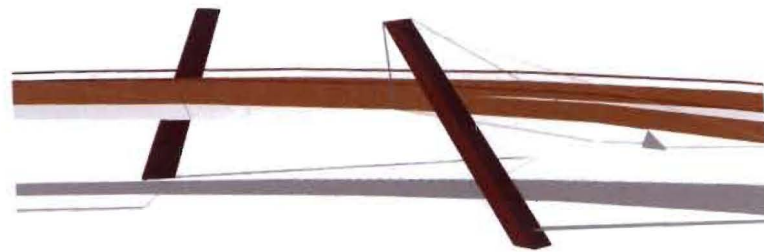
This habitat reserve was destroyed following the earthquakes, as the small habitat was not enough to handle the extreme flood. Increase connection to surrounding habitat is necessary.

• • • • • Rawhiti Red-Zone

This neighborhood is the closest connection to the bay, the city's eastern border and the closest connection to the sea

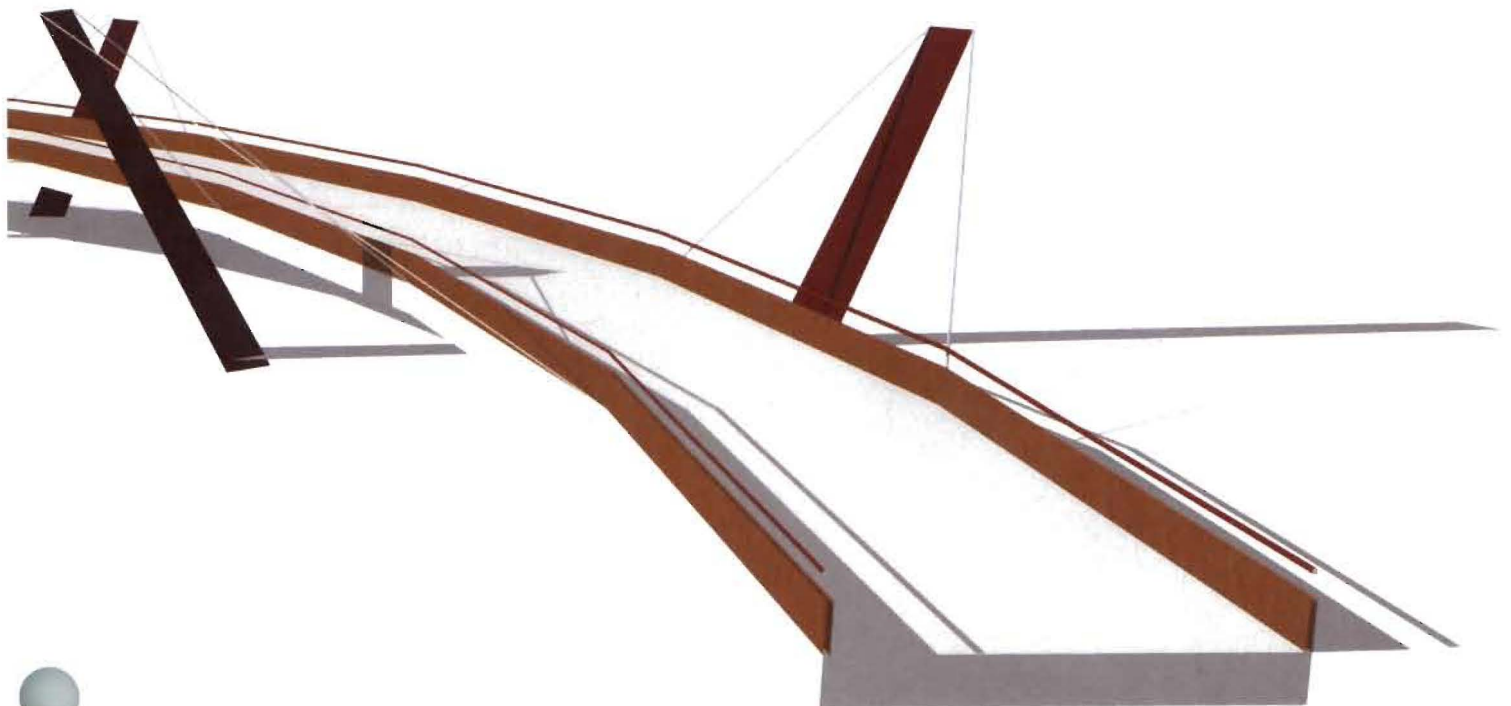


Bridge Concept A



Connection Concept

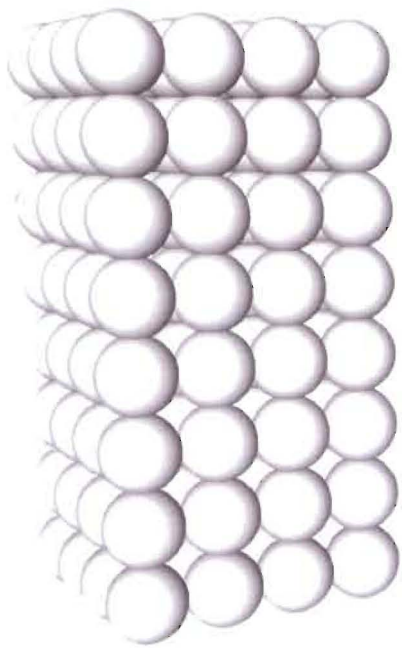
A lack of connection between the different red-zoned sites led to a concept that is simply a river walk. Bridging architecture could be threaded through the site and even the red-zone as a whole. This system would not only create a system of pedestrian connection that could connect north and south and city to sea, but also become architecture that gives the space an identity and image. The bridge concepts below and to the right abstract the story of Maui. Like he pulled the land out of the sea, the bridges use reeling structural systems that pull the bridge's walking surface out of the ground.



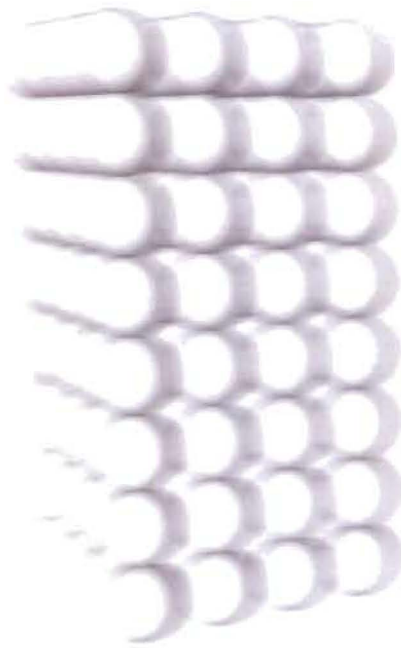
Bridge Concept B

Riverfront Soil Evolution

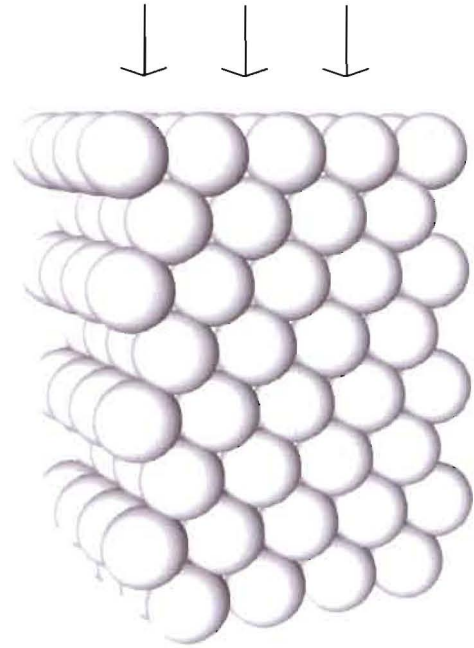
The site runs along the Avon River, which was in an already degraded condition. Following the earthquake, the ground liquefied, causing the earth to settle and fall to a level below that of the river. This worsened the impact on the residences that were already sitting in a floodplain



Soil before earthquake



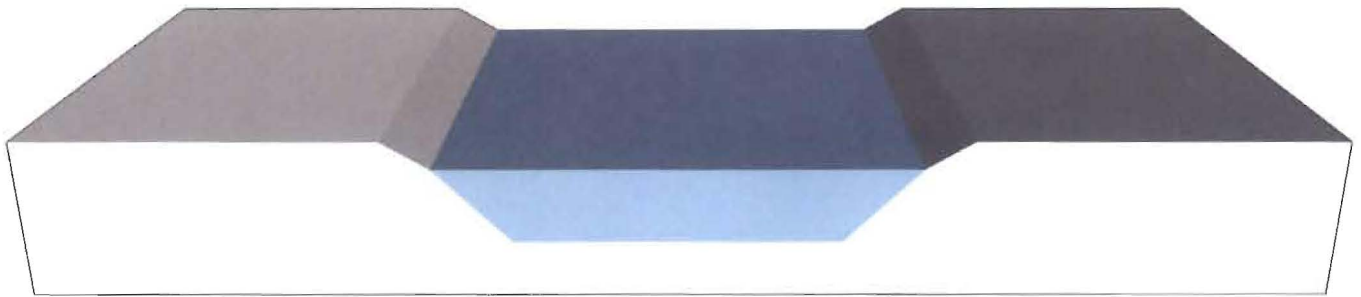
Earthquake liquefies soil



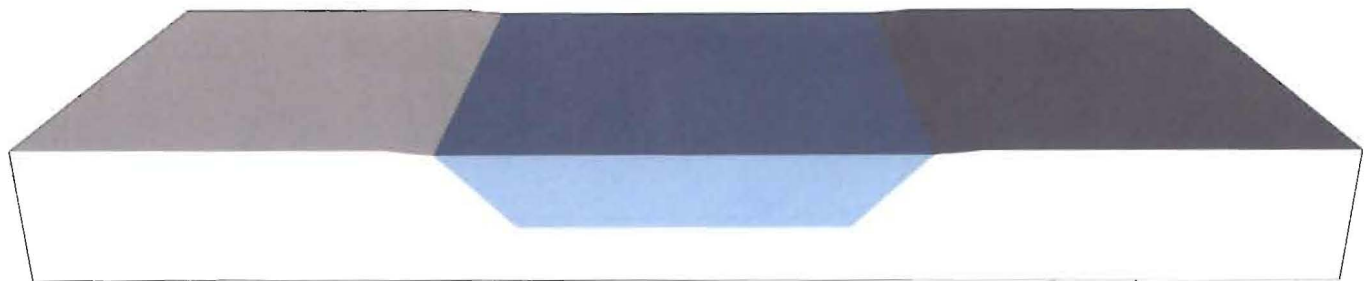
Soil after earthquake

Effects on the Landform

The diagram below illustrates what this settling soil did to the land surrounding the river as a whole.



Landform before earthquake

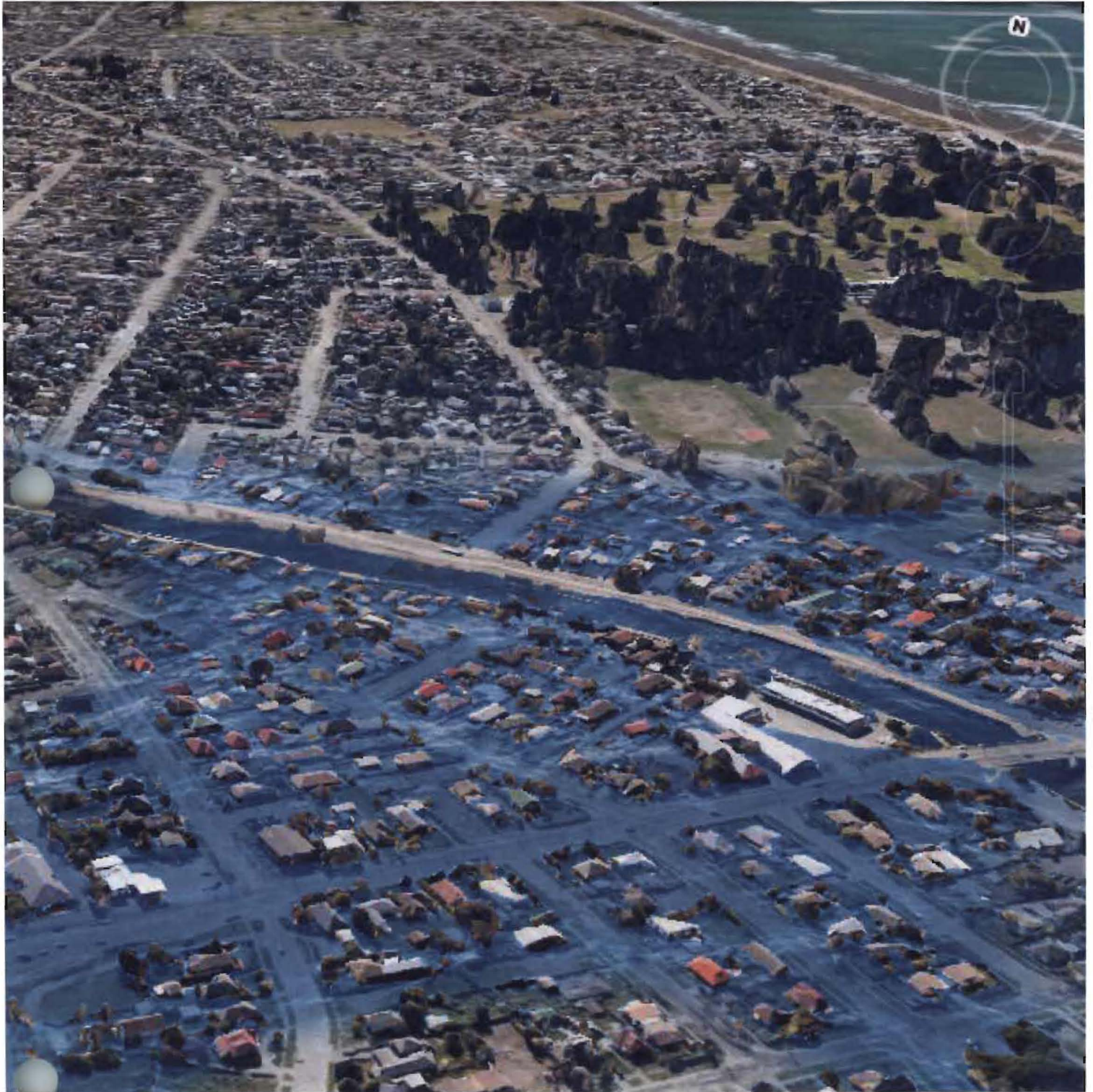


Landform after earthquake

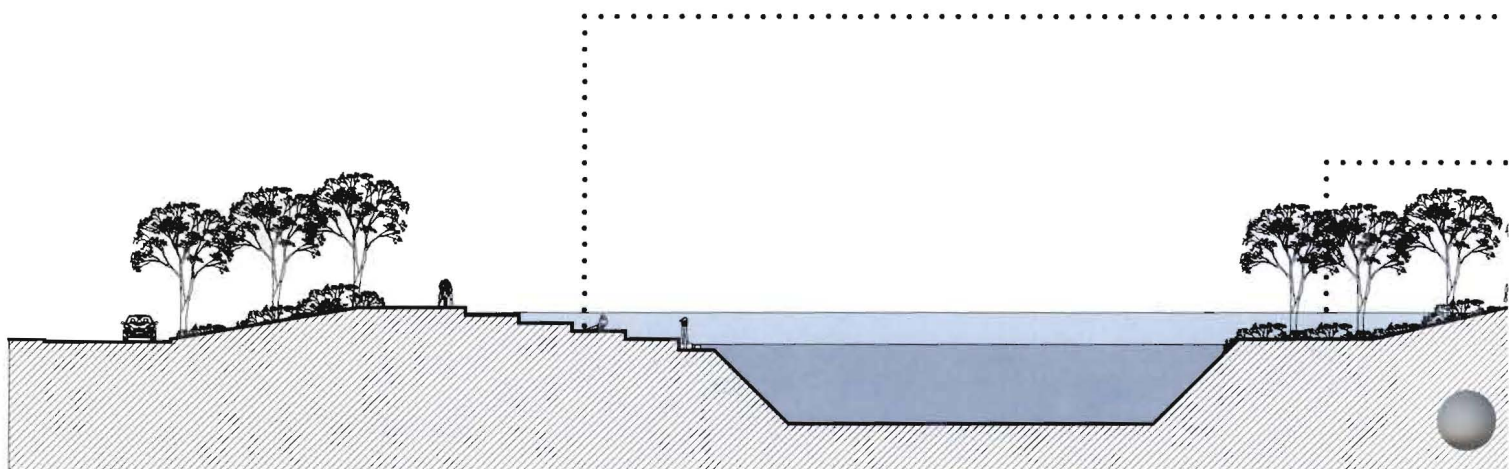
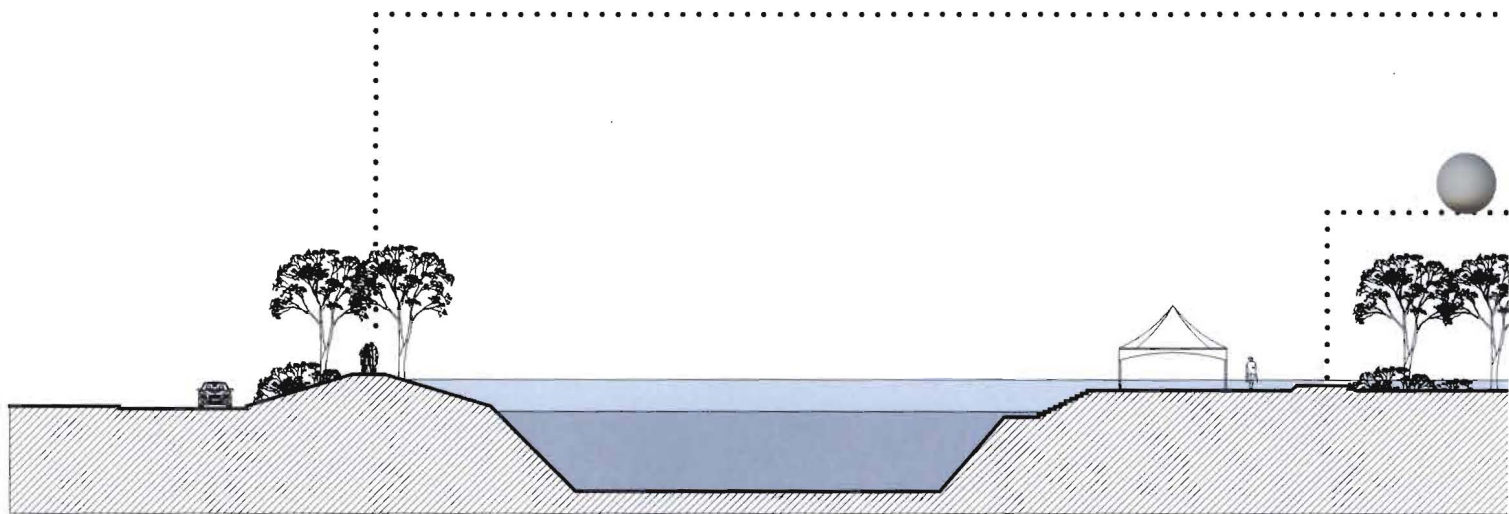
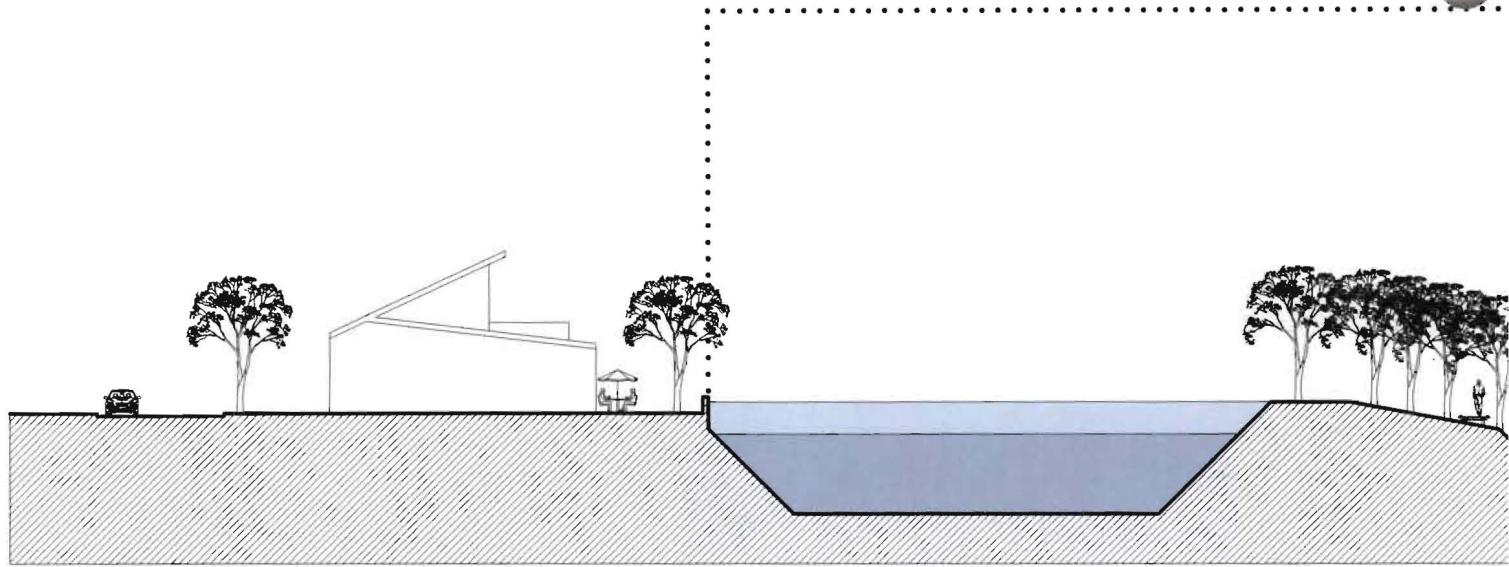
Site Flooding

The rendering below gives a 3D visualization of the extent of the river's flooding during a 100-year storm.





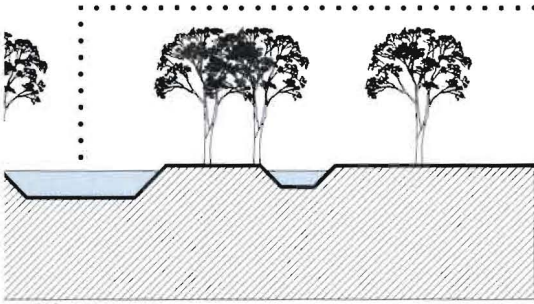
Addressing the River





Vertical Resistance

Implementation not only defines river's edge to prevent lateral spread, but also defines the edge of the park or urban space on the other side. Enclosure is held at the human scale while still connecting to the water's edge.



Branches and Flood Channels

Allowing the river to naturally flood the spaces it wants to flood in a controlled manner can be used to create valuable natural areas while carrying away water in extreme conditions.

Dikes

Dikes can be reprofiled and reprogrammed to be used as path networks that pull visitors along the river's edge, easily linking people to both their city and their landscape.



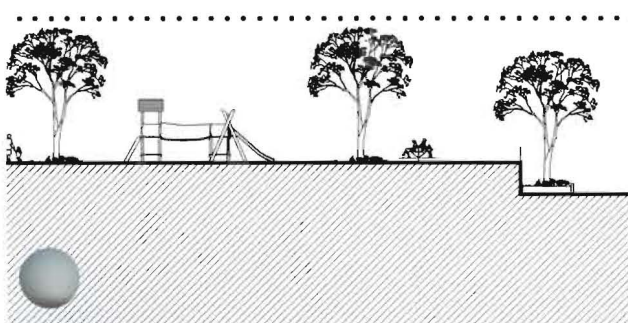
Mounds

Mounds can be used in agricultural settings to allowing a controlled amount of flood-water to fill production areas.



Steps

Terracing down to the river provides opportunity to adapt to the river's changing water levels while at the same time providing human access.



Submersible Plantings

Riparian plantings can be used to both handle flood waters and enhance the aesthetic of the river's edge.

Final Concept

This axonometric concept drawing combines the concepts drawn from the programmatic, connection, and ecologic analysis. Visitors experience a river walk that pulls them through different zones, ranging from social and urban in nature to habitat-focused. Different flood mitigation techniques are implemented to begin restoring the form and ecology of the river.



Goals and Objectives:

Restore the ecology of an already degraded Avon River

- Placement of structural and natural systems that battle topography change and lateral spread occurring along the river's edge.
- Program placement based on ecological foundations to create continuously functioning social spaces.

Design a socially active core for Christchurch's eastern suburbs

- Provide opportunities for recreation on both water and land.
- Allow for interaction with the site's ecology to increase knowledge and ownership of the land.

Connect the people of Christchurch to the site and to one another.

- Provide unbroken pedestrian and automobile connections.
- Use architecture to create an identity that binds the site's varying program.





Master Plan

Cockayne Reserve

Sculpture Garden

Urban Development

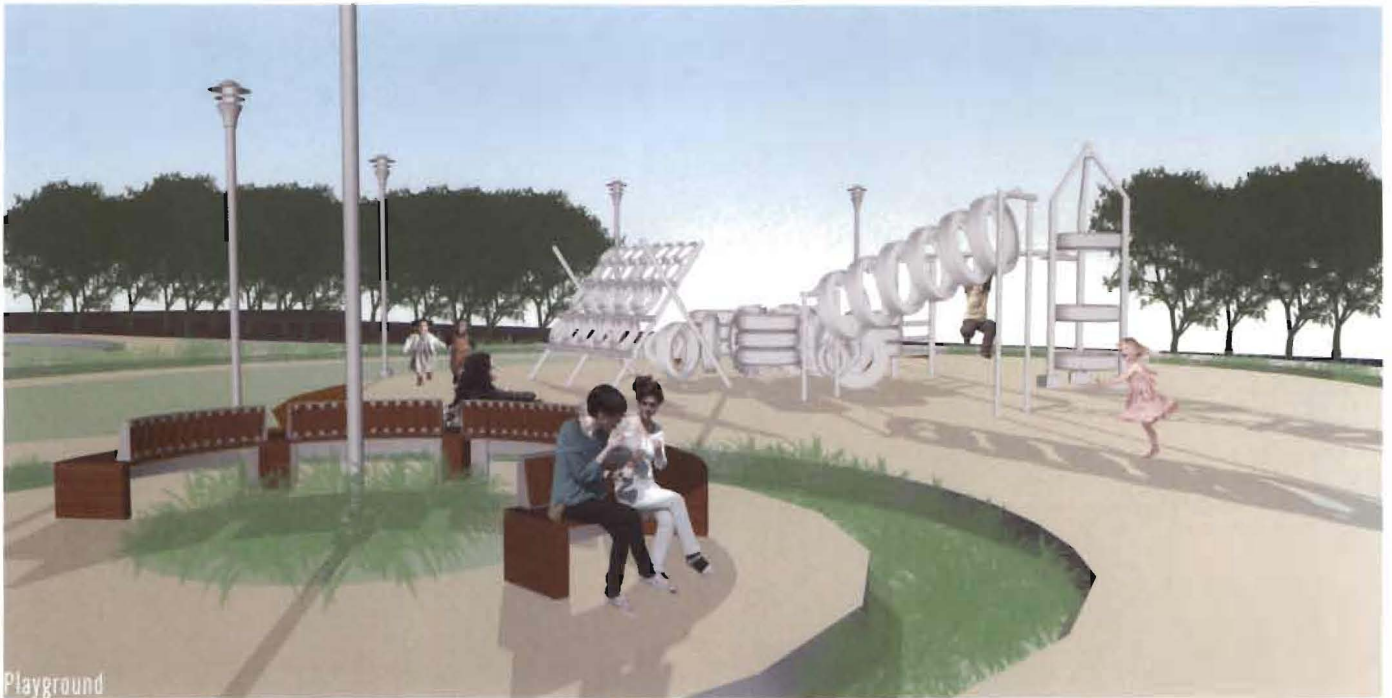
at / Water Management



A Variety of Spaces

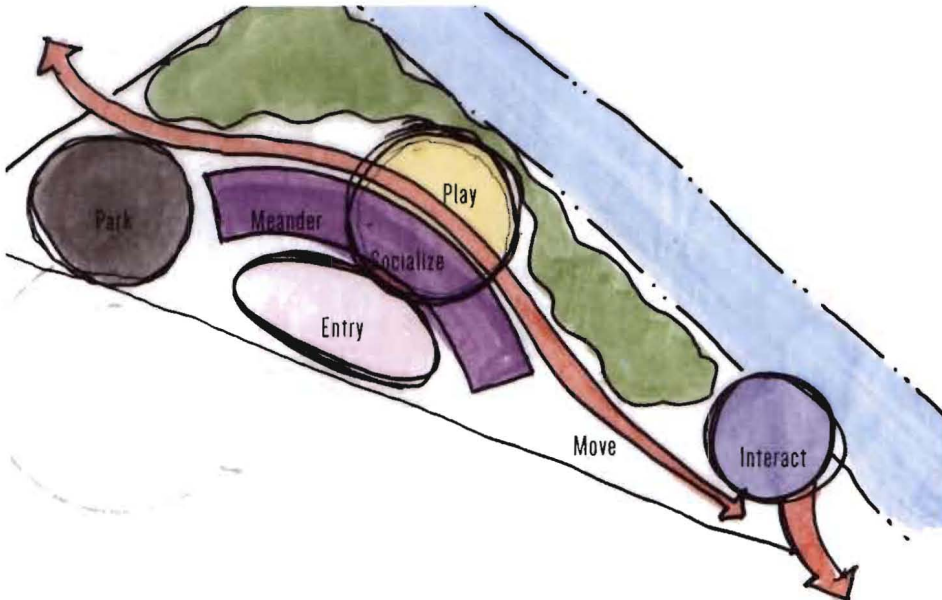
These perspective begin to illustrate the human experience as one travels through the designed master plan.



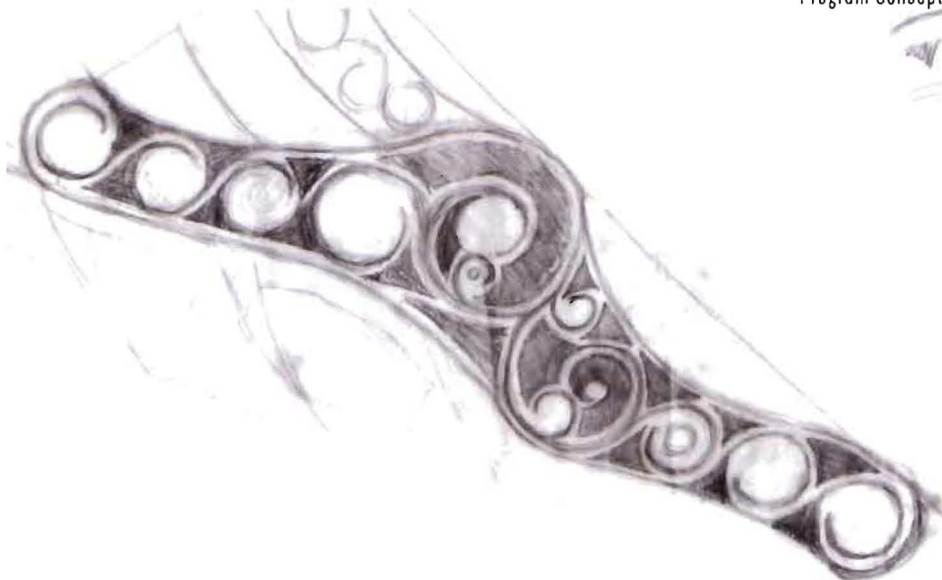




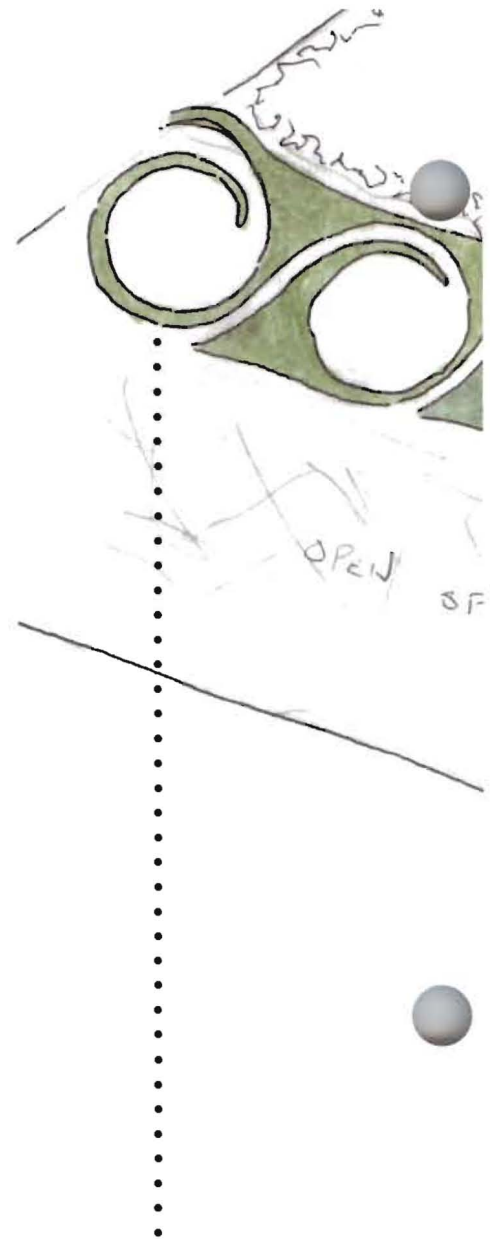
Site



Program Concept



Form Concept



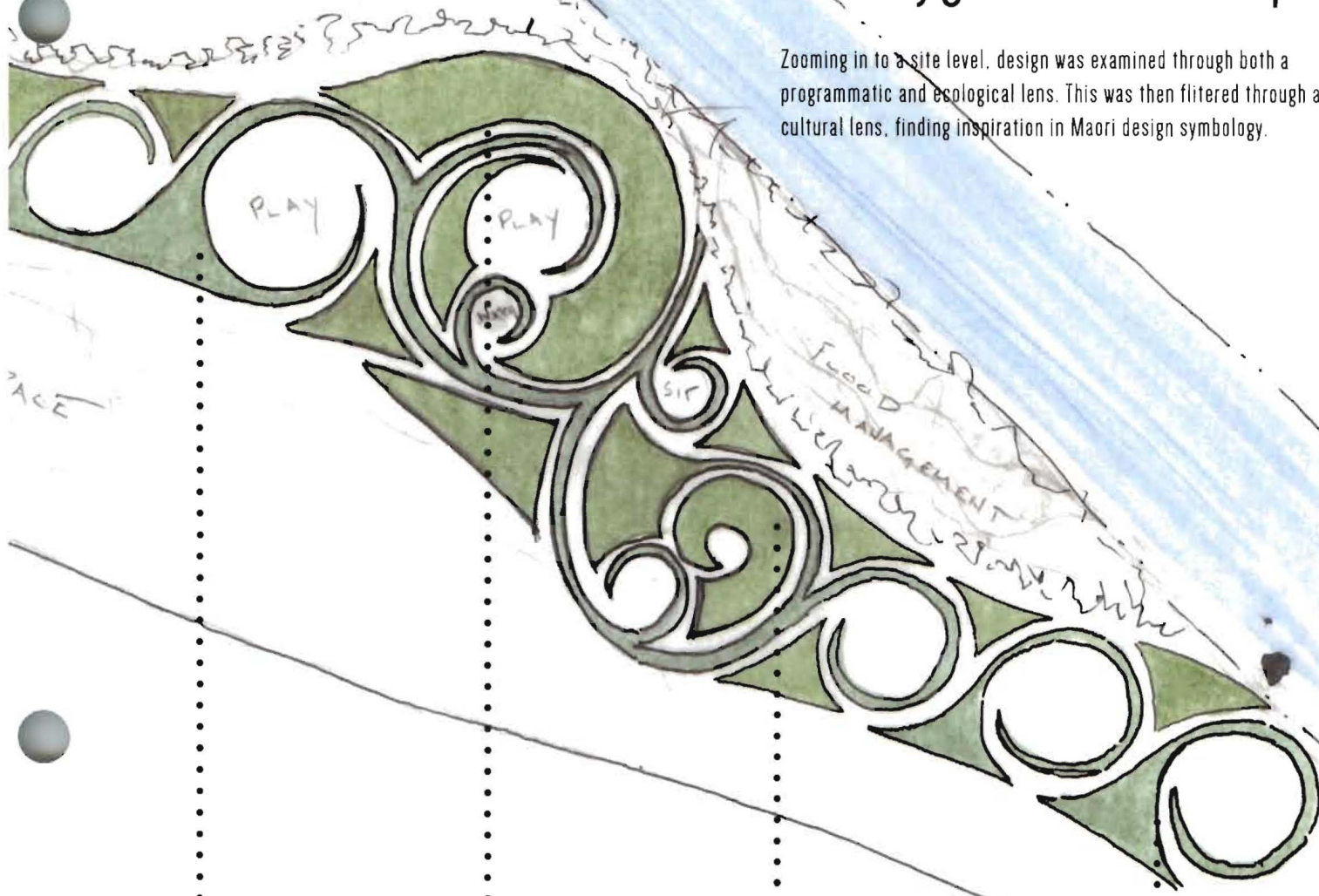
Double Twist

The joining together of
two people or two cultures
for eternity.

LOOD
MANAGEMENT

Playground Concept

Zooming in to a site level, design was examined through both a programmatic and ecological lens. This was then filtered through a cultural lens, finding inspiration in Maori design symbology.



Fish Hook

A symbol for strength and prosperity



Whale Fin

A symbol for family love, playfulness, harmony, and friendship



Koru (spiral)

A symbol for unity, growth, and new beginnings



Single Twist

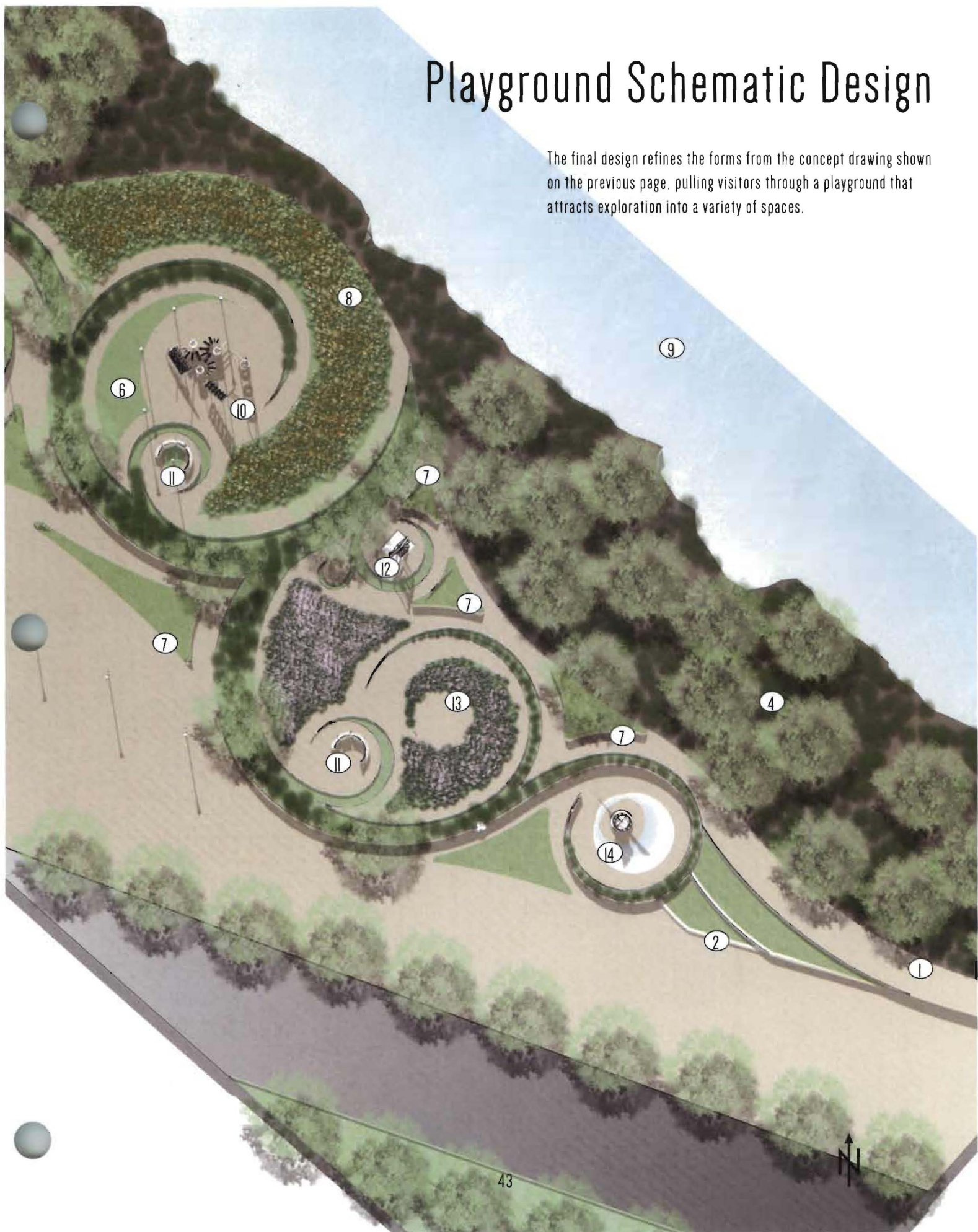
The journey of life and the symbol of eternity.

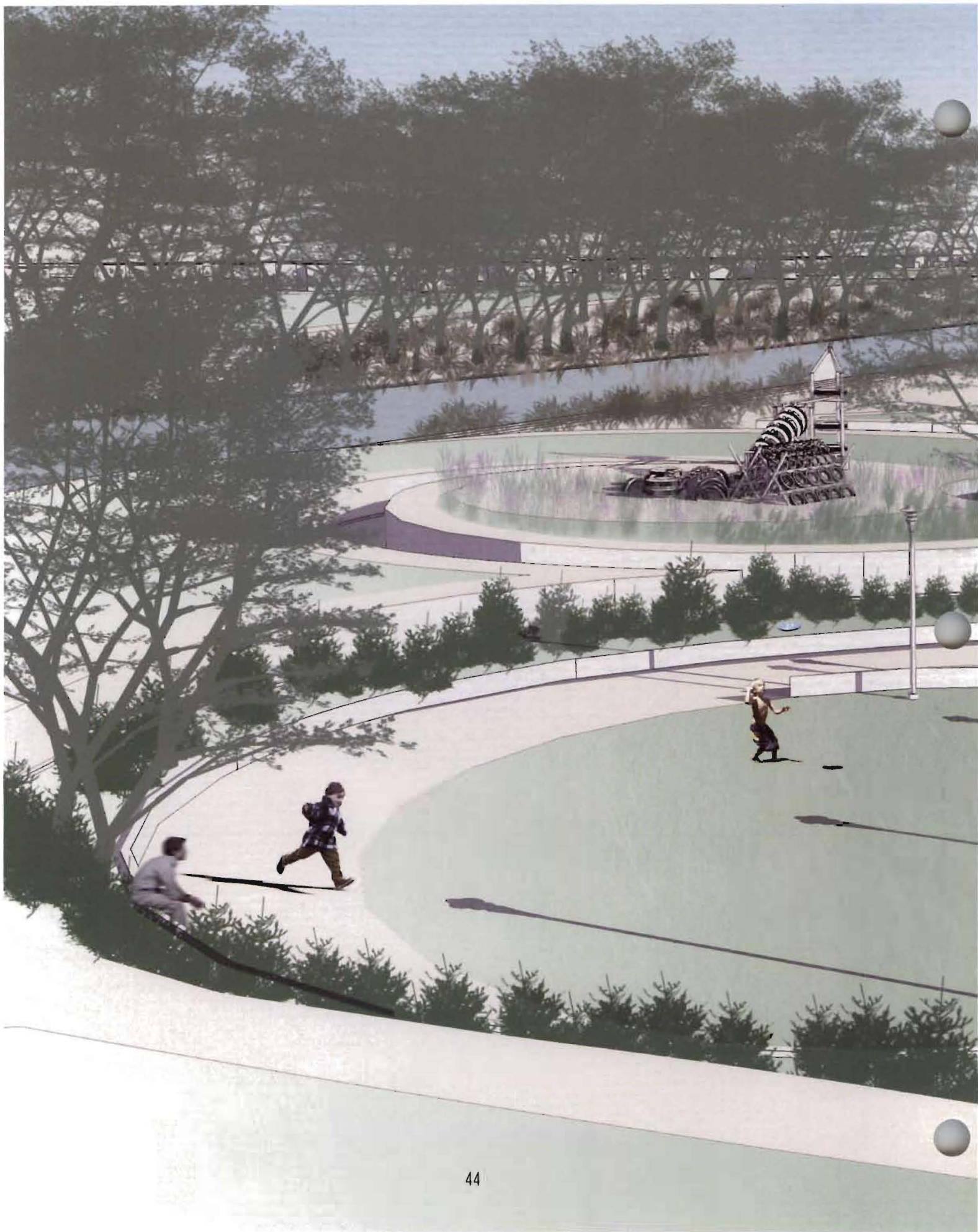


- | | |
|----------------------------|-------------------|
| ① Connection Off-Site | ⑧ Riparian Garden |
| ② Ha-ha | ⑨ Avon River |
| ③ Open Plaza | ⑩ Playground |
| ④ Flood Management | ⑪ Seating |
| ⑤ Garden / Water Retention | ⑫ Interactive Art |
| ⑥ Open Lawn | ⑬ Garden Space |
| ⑦ Raised Lawn and Seating | ⑭ Water Feature |

Playground Schematic Design


The final design refines the forms from the concept drawing shown on the previous page, pulling visitors through a playground that attracts exploration into a variety of spaces.





Playground Axon View

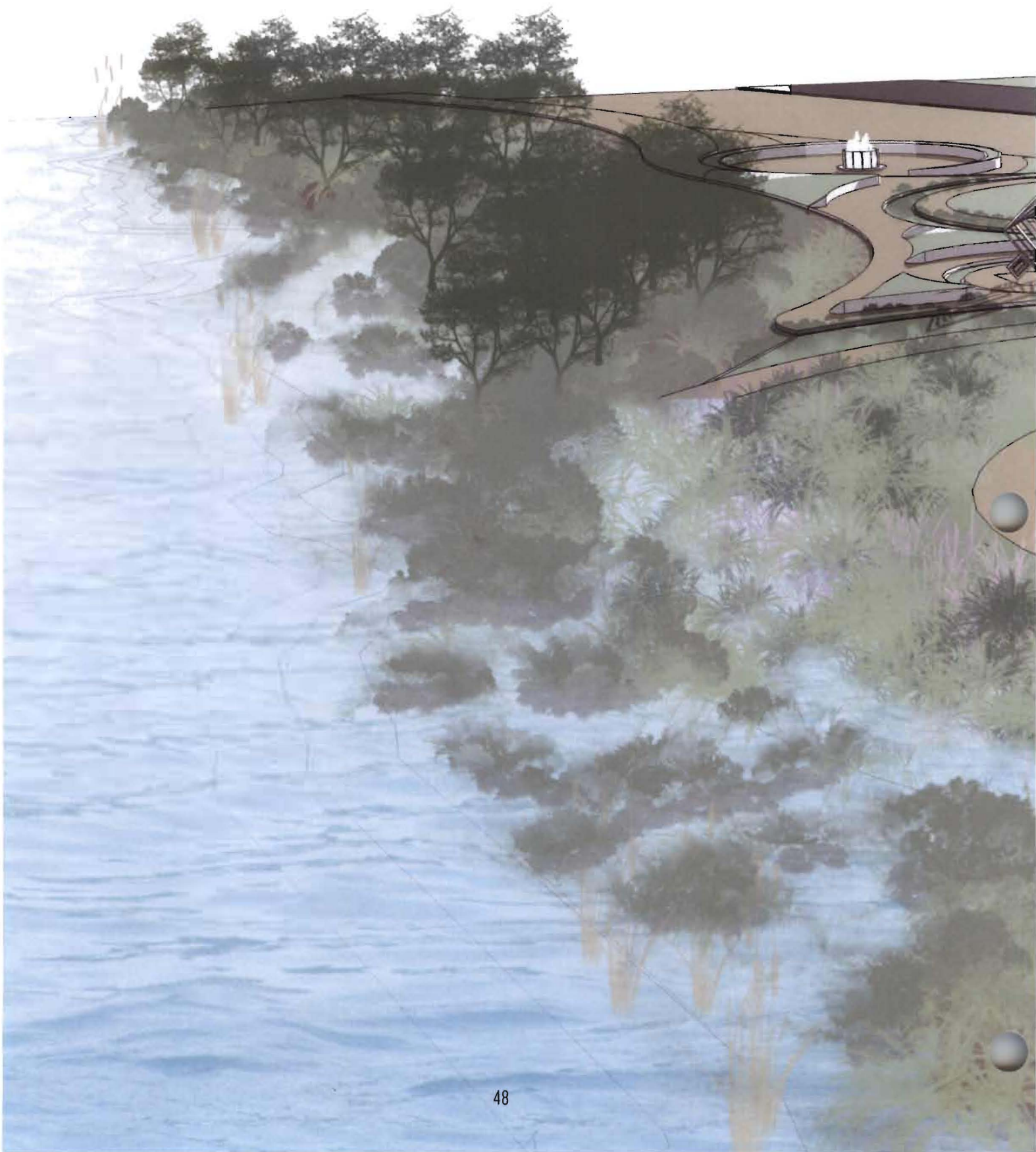




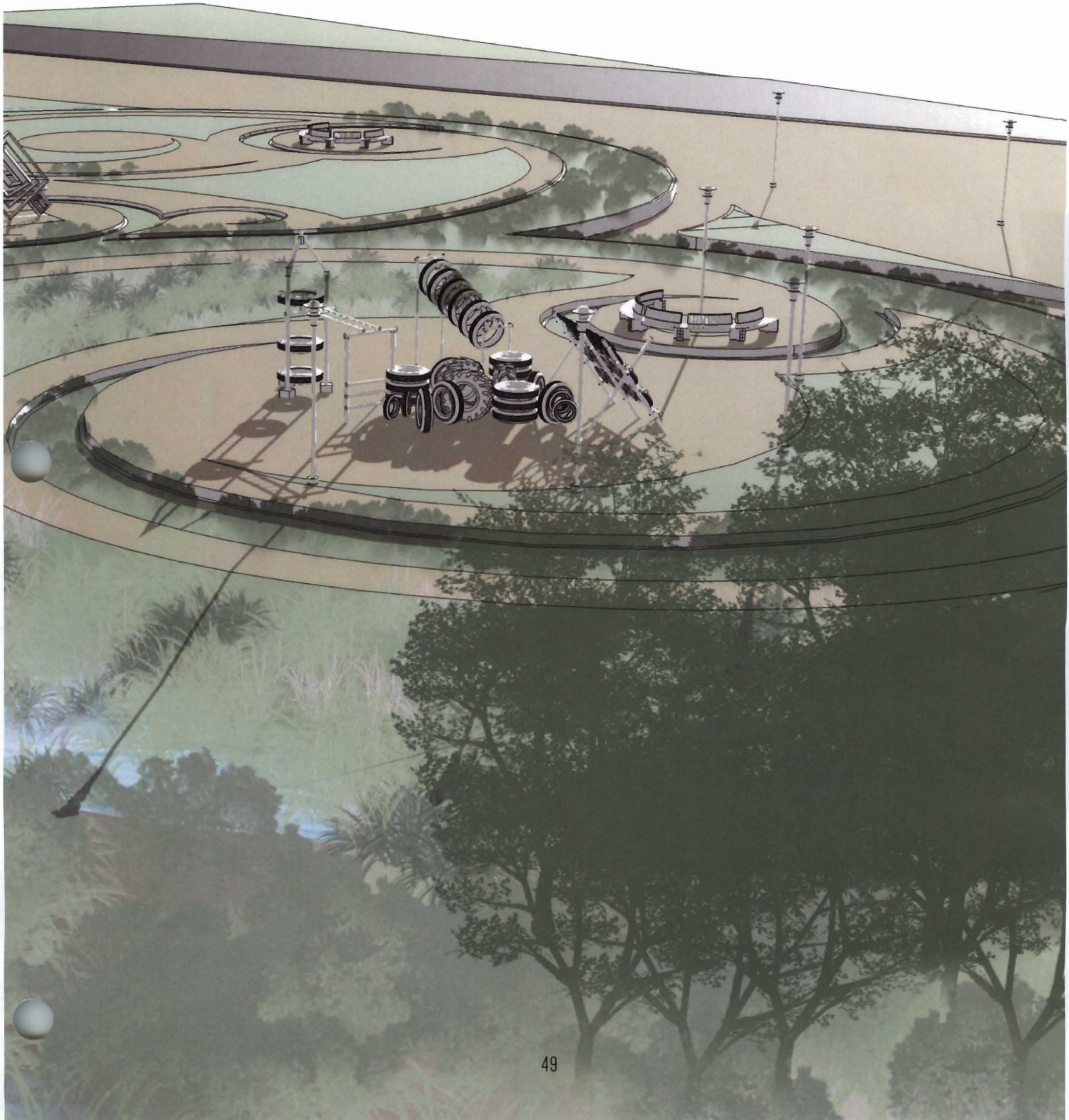
In addressing the river, the playground has carefully been laid upon the land. Water will be allowed to rise and fall without interfering with the site, only interacting with it.

Playground- Normal Water Levels





Playground- 50-Year Flood

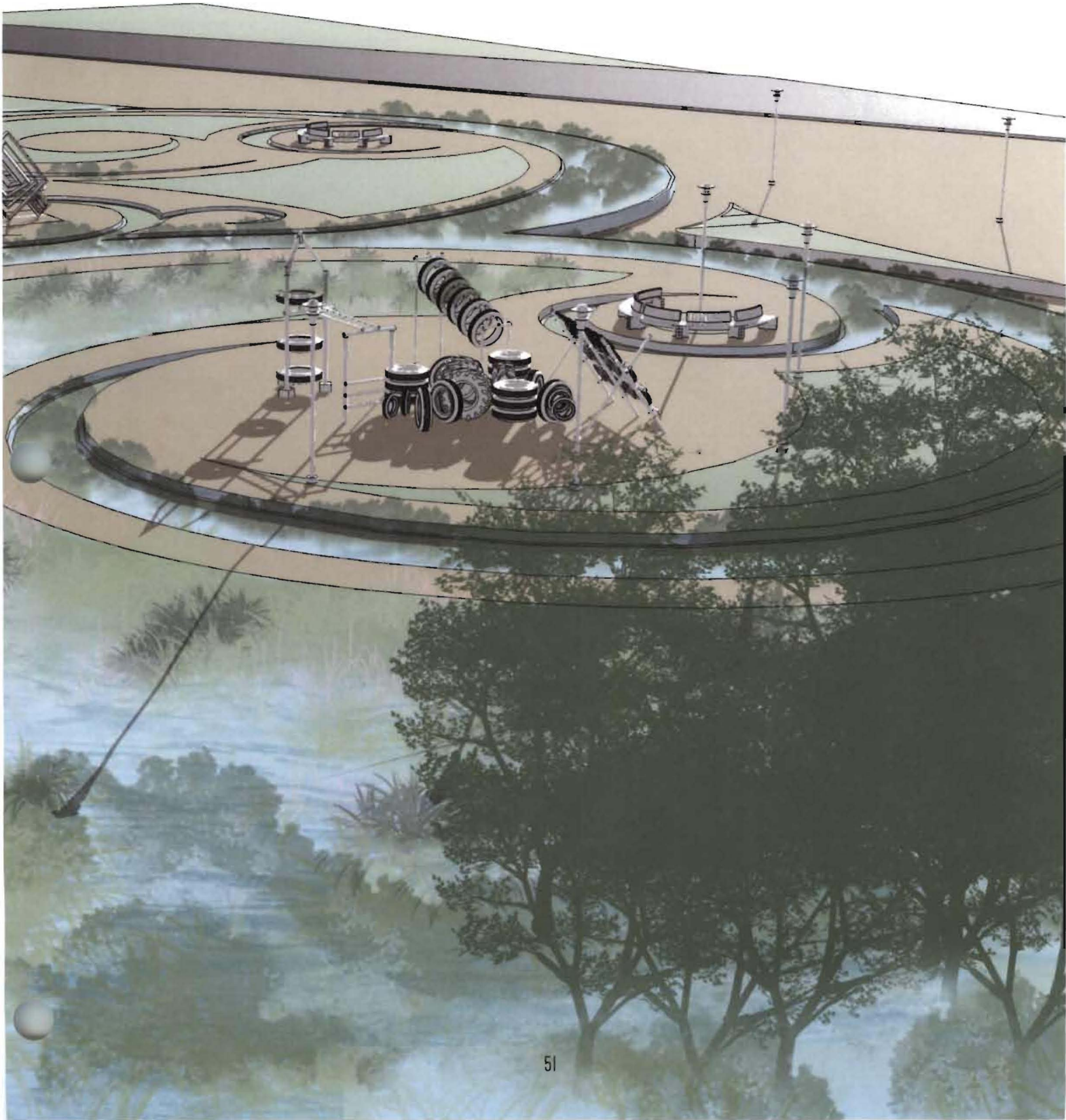




Conclusion

In conclusion, this project activates a new green core for Christchurch's eastern suburbs. Through careful and conscious design, the ecology of a degraded Avon River can begin to be restored. Through the placement of structural and natural systems, this design battles the topography change and lateral spread occurring along the river's edge. Moreover, program placement based on ecological foundations creates continuously functioning social spaces. The spaces provide opportunities for recreation on both water and land, as well as allowing for interaction with the site's ecology to increase knowledge and ownership of the land. This interaction is allowed through a threading of unbroken pedestrian and automobile connections that use architecture to create an identity that binds the site's varying program.

Playground- 200-Year Flood



Appendix A: Neighborhoods

Neighborhood Area: 486 acres

Red Zone Area: ~61 acres

Notes: The red-zoned area follows the rivers, a thread between Avesbury Park to the south and Richmond park to the north.



Neighborhood Area: 326 acres

Red Zone Area: ~119 acres

Notes: Avonside is the second-oldest neighborhood in Christchurch. The neighborhood takes its name from the area's church, Holy Trinity Avonside. The church was destroyed following the earthquakes.



Neighborhood Area: 326 acres

Red Zone Area: ~153 acres

Notes: n/a





Neighborhood Area: 390 acres

Red Zone Area: ~169 acres

Notes: Red zone is almost completely surrounded by ecological features, with the Avon River to the southeast and Horseshoe Lake Reserve to the north.



Neighborhood Area: 485 acres

Red Zone Area: ~128 acres

Notes: This neighborhood suffered high amounts of infrastructure damage due to soil liquefaction.



Neighborhood Area: 300 acres

Red Zone Area: ~132 acres

Notes: Named after Travis Wetland, on the neighborhood's northern border. The wetland is an ecological restoration program.

Neighborhood Area: 591 acres
Red Zone Area: ~90 acres
Notes: n/a



Neighborhood Area: 379 acres
Red Zone Area: ~30 acres

Notes: Although only a small portion of the neighborhood was damaged, the area as a whole suffered major damage. The neighborhood has a low socio-economic status, and looting has become a problem.



Neighborhood Area: 618 acres
Red Zone Area: ~125 acres

Notes: Bexley is a high risk flood zone. Because of this, soil liquefaction was a huge problem during the earthquakes and caused major damage.





Neighborhood Area: 369 acres

Red Zone Area: ~6 acres

Notes: Only a small area here has been red zoned, and because of this the government has been slow to reconstruct this neighborhood. The neighborhood is filled with recreational opportunities for activity.

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